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THE PAPER INDUSTRY

SEPTEMBER, 1935
Vol. 17—No. 6

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

LEADING ARTICLES

Which Coal?' The Coal that Makes the Cheapest Steam..... ..... *Chester Reed Earle* 397

Blue Stain Development in Peeled Shortleaf and Loblolly Pine Pulpwood ..... *George H. Hepting* 402

Synthetic Resins for the Paper Industry..... *Samuel S. Gutkin* 405

Belt Static Prevention..... *Wayne Davies* 407

Nomographs for Rigidity, Stiffness and Softness of Paper..... ..... *D. S. Davis* 409

Animal and Fish Glues..... *Fred Holt, Jr.* 410

REGULAR DEPARTMENTS

Editorials	379-380	Technical Developments	429
Current Thought	382	Papermaking Patents	435
Paper Sketches	408	Commercial Outlook	439
New Publications	417	Domestic Raw Materials	441
Opportunity Section	418	Imports and Exports	443
Safety Contest Scores	425	Advertisers' Classified Index	445
Power	427	Index to Advertisers	449

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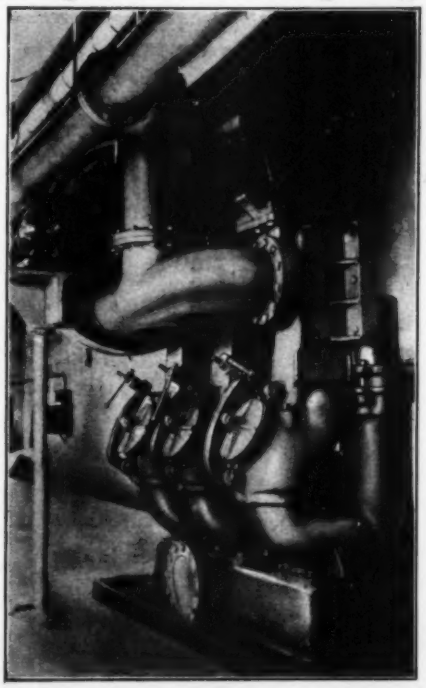

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Business Recovers.....
Despite Politicians

IN spite of the anti-business campaign which the administration has pushed against business recovery, business is recovering.

Examination of all business trends will show that business began its last upward surge May 27—the date of the Supreme Court's decision on the "sick chicken case," by which decision the emergency political set-up known as the N.R.A. was chucked out of the window.

The whole business world heaved a great sigh of relief when the Supreme Court's unanimous decision was announced, because that decision, with one stroke of the pen, swept out of the path of business progress the intolerable interference of political bureaucratic governmental snoopers who had clamped down on business men like a London pea-soup fog.

Emerging from that dark situation into the clean sunlight of clear business program, activity at once appeared, continued through June, and in July and August carried through an unprecendented contra-seasonal advance that is the wonder of every business statistician and commentator in the world.

In the meantime, what was the measure of the administration's co-operation?

On the Friday following the Supreme Court's decision, the President at his now famous press conference, condemned the Supreme Court's unanimous decision. He predicted that with the passing of his hastily thrown together political N.R.A. business would do a tail-spin, flunk back into 1932 disorganization, and come back into his lap asking his help again.

For one month, almost to the day, he waited and watched for the repentant business interests to return for administrative help. Instead, his fact-finding boards reported to him that business was bounding forward.

Then, came the deluge of adverse, anti-business, anti-recovery measures, poured like machine gun fire into the ranks of sturdy warriors, doggedly plowing ahead with business recovery:

The "must" measures — Must-be-passed-in-six-hours-soak-the-rich-bill,—upon which Senator Pat Harrison took the rap for the executive (Senator Pat feels he "must" be re-elected, so he "must" take the rap); the little N.R.A. act, known as the Guffey coal bill, concerning which the executive head of this Government wrote Representative Hill of the House —"don't let your doubts as to the constitutionality of this bill, no matter how reasonable, prevent the passage of the act,"—or words to that effect; the amendments to the A.A.A. act; the Banking act, and a dozen more, all designated to bog business down and whip the real recovery workers into subservience to his political dictum.

Never on this continent has there been witnessed so bald a piece of political treachery as that shown by the administration since the 27th day of last May.

Of course, business winched—shot in the back while going forward. But while the commodities groaned and the equities moaned, general business closed the gaps and has forged steadily ahead. Despite the desertion of the administration, the course of industrial recovery to which its full co-operation was pledged, and nothwithstanding the spiteful attempt in the last thirty days to short-circuit the upward surge, business continues its onward recovery momentum and presently the New Dealer will smilingly claim the results as his own.

Politics, where are the charms that voters have seen in thy face?

+ EDITORIAL +

A Monkey Wrench in the Machinery

THE story has been told in the industry of a mill that had to shut down temporarily because of the failure of one major item of equipment and of the grief that ensued in getting the plant back into operation. The manager was up in arms; the superintendent was irritated; and the engineer and master mechanic were in a quandary. The cause of the failure could not be determined. As it happened, the mill was located within a comparatively short distance from the plant that manufactured the machine which was crippled so the manufacturer was called upon for expert advice. A specialist was immediately delegated to the job but he too was baffled. The difficulty for some unknown reason could not be located.

Progress certainly was not being made. The manager, superintendent, and others who were not actually engaged in attempting to make the necessary adjustment were standing around and looking on as is so apt to be the case when someone is in difficulty. Talk was pretty cheap, but one of the bystanders suggested that "Old Joe," somewhat of a roustabout in the plant, might know what to do to repair the machine. The superintendent, in his anxiety and thinking that it was neither time nor place for joking, bristled and snarled that the suggestion was outrageous; but the manager, a little more calm, suggested that "Old Joe" be located and brought to the job.

This was done and the situation explained to him. He immediately asked for a few simple tools and went to work. In a comparatively short time a rather minor adjustment was made and he gave the order to throw in the switch. The machine started without a murmur; and the story goes on to tell that "Old Joe" was then amply repaid for his effort.

Although this homely little tale may be pure fiction, it does reveal a truism that cannot be denied—that even the best are not infallible and that ideas cannot be monopolized. For that reason, it is hard to understand why some individuals are so prone to take themselves too seriously and to overrate their own abilities but to underrate the ability of their associates. Why should it be so?

The Conservative Papermaker

PAPERMAKERS as a whole are a rather conservative fraternity. They have learned through the years that time is the best proving ground; that startling developments seldom happen over night; and that revolutionary changes in equipment and in processes commonly come slowly.

It took many centuries of papermaking experience, when paper was made by hand, to develop the Hollander and even more time to conceive the paper machine. Other process equipment developments seemingly may have been more rapid, and yet they have been the result, probably in every case, of years of observation, study and painstaking effort.

The search for raw materials, likewise, has been one of long standing. Work in this direction has gone on with unabated energy for many years. Many materials have been tried. Most of them have been found wanting. In fact, comparatively few of the raw materials from which paper might be made and which have been studied in various researches have proven themselves to be economical sources of papermaking fiber.

Research activities of recent years, of course, have made possible the utilization of wood species which a quarter of a century ago would have been considerd most unsatisfactory. Yet even here most of the practical development has been kept within comparatively narrow limits.

It is highly probable that as time goes on there will be a simplification of processes for converting raw materials into both pulp and paper; that fewer items of process equipment will be required in the operations; and that chemicals not now employed commercially by the industry will find their way into common use. Such is progress.

Experience, however, has taught the need for caution and progressive manufacturers well realize the need for it. Every change must prove itself on a basis of practicality. Unless a change is practical, why make it?

This attitude of mind may be epitomized by quoting an expression from one of Douglas Malloch's well-known poems, "Don't you be too sure too soon."

Vacation Is Over

WITH the passing of Labor Day, one of six of our national holidays, the regular vacation season for the year for most people is over. Summer camps and cottages have been closed. Schools have opened. Camping paraphernalia and fishing tackle have found their way into their favorite nooks where they may hibernate for another nine months.

The holiday apparently puts an end to summer inertia and lethargy. There is work to be done, and whatever the reason, the desire to do it seems to be stimulated with the passing of Labor Day. After the holiday, business settles down for the fall and winter months and plans are made accordingly. It is just a matter of habit—the summer lull, vacation, Labor Day, and then concentration on the work at hand.

This work is approached with a clearer vision, a new outlook, a fresh start, an unrestrained enthusiasm and a burst of energy that is unusually forceful. The decks are soon cleared of all impedimenta that accumulated during the preceding months and action is started on work that is new. So it has been for a number of years and this year should be no exception. Now is the time to be getting things done.

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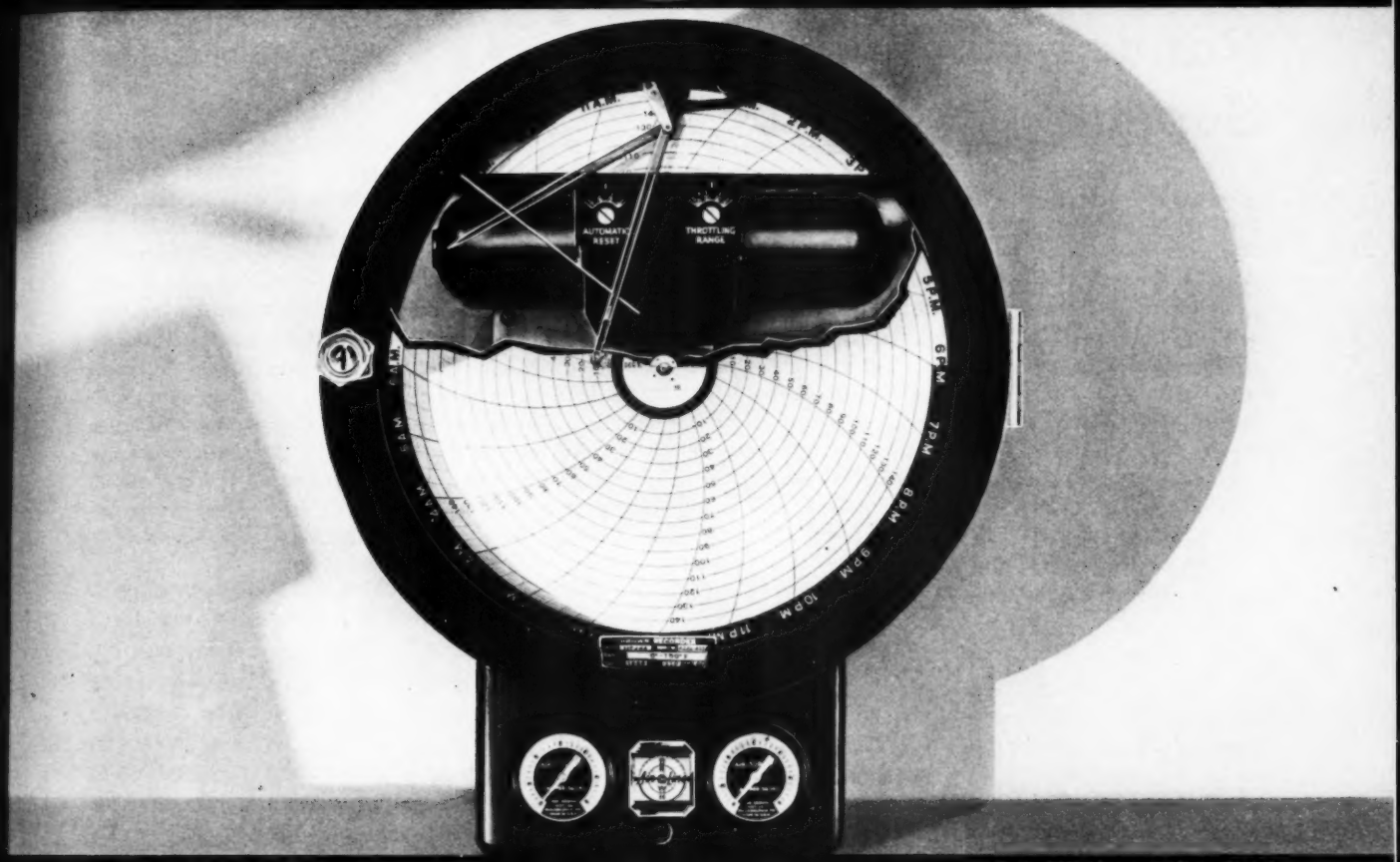

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Random Thoughts for September

By WILLIAM SIBLEY

◆ ALONG ABOUT THE TIME the crickets, tree-toads and bull-frogs institute their choral and orchestral societies; when nature has garlanded herself with hollyhocks and the elderberries and hydrangeas give notice of future snows; when the summer girls are beginning to grow weary of their semi-Ethiopian complexions—the season of corn-on-the-cob bursts into full flower. It is right now that we corn-fed Americans are privileged to place our feet under the festive board and emulate the lowly rodent by gnawing tenderly toothsome Golden Bantam, Evergreen, or Country Gentleman, sublimely ignoring the rivulets of melted butter which trickle down our chins.

Corn on the cob is the quintessence of summer. It is condensed sunshine and distilled dew. All of the daintiness of rose-tinted dawns, all of the rapture of sun-illumined fleecy clouds, all of the soft firmness of tassled silk, all of the mystery of scented, breeze-caressed midnights are combined and embodied in this cylindrical monument to Elysian joy.

◆ SPEAKING OF CLOUDS, reminds me of my very recent airplane trip to New York City. I had taken a chair in the plane that leaves Chicago at three a. m., its first stop being Cleveland, at 5:30, its second and last stop being New York City at about a quarter to eight. After getting a cup of coffee at the Cleveland airport (while the mail was being changed) I climbed aboard again, and promptly dozed off. How long I slept I don't know. But I do know that when I awoke I might just as well have been on Mars, Jupiter or Saturn for all recognizable objects there were to see. We were flying eastward about a thousand feet above a solid floor of clouds. Not a tear appeared to permit me to see the earth. As far as the eye could see there was nothing but a solid mass of cloud flooring.

This in itself was a sight. But directly above us was an equally solid *ceiling* of clouds. . . . About twice as far away—two thousand feet. Yes—there we were skimming along between two layers of solid clouds. One below to form the floor; one above to represent the ceiling. With the atmosphere in between these stratified clouds just as clear and clean and free of floating wisps of mist as the brightest of sunshiny days.

And at that very rare moment, the great ball of fire in the East was just begging permission to come up. Anticipating no refusal on our part the sun peeped ever so hesitatingly over our cloud-floor. Then, when the sun saw us, so unexpectedly between these stratified clouds, it simply blushed! And blushing, the sun made our ceiling of clouds a bright, brilliant gilt. A very light shade of canary, as far as the eye could see. And by refraction those sun's rays were turned from the ceiling to illumine our cloud floor. . . . Which made the hillocks of cloud fleece a deep gold on the sun-side and a deep burnt-orange on the shade side. Men—even yet as I write about this marvelously beautiful sight my spine is vibrant to the tingle of ten thousand thrilled nerve-ends.

◆ THESE REMINISCENCES somehow suggest the great loss we recently suffered through the death of Wiley Post and Will Rogers. A tragedy that becomes a national calamity. Through that unfortunate incident this nation has lost much of the necessary research that is yet necessary to make aviation still more practical. And, simultaneously, this nation has lost thousands of laughs and ten thousands of chuckles through the passing of Rogers, which truly is a calamity of first water. Will Rogers was the embodiment of everything that was clean in humorous entertainment. He proved over and over again that smut and dirt are entirely unnecessary. He proved equally well that kindliness in humor is infinitely preferable to sharp-tongued cunning. He was never mean; he was always big. He would poke fun at the most prominent of men, but his fun was always good-natured. It was never tinged with sarcasm, or flavored with a biting slur. We have, indeed, lost two great men.

◆ NOR SHOULD YOU evidence such superficial thinking as to say that such calamities will stop the inevitable progress and growth of aviation. Air travel is the ultimate. Some day our air transportation will be more important to this country than our railroads. It will rival in both importance and numerical strength our automotive industry.

There are two great industries just now beginning, aviation and air-conditioning. Both may become larger and more important than any industry we now know.

THE PAPER INDUSTRY
A MONTHLY EDUCATIONAL JOURNAL

WHICH COAL?

. . .The Coal that Makes the Cheapest Steam

CHESTER REED EARLE

COAL may be low grade or high grade. It may cost two dollars and a half a ton or five dollars a ton. It may have a high heat value per pound or it may have a low heat value. But you, as a paper mill executive, are primarily interested in the cost of each thousand pounds of steam that must be used in making paper. If you are burning in your boiler plant the coal that gives you that lowest cost per thousand pounds of steam, you do not care what the quality, price or heat value of the coal may be.

This sounds like a paradox. It *is* a paradox. Not only that, but the injunction to burn the coal that makes the cheapest steam is not so simple as it sounds. It makes you want to ask immediately, "How do I find out which coal that is?" It is the author's purpose to discuss in a non-technical way the principal factors that enable paper mill executives and engineers to answer that question.

It seems hardly necessary to point out to the mill executive the importance of selecting the proper coal for his particular mill. Yet it is amazing that many executives, not only in the paper industry but in all other industries as well, possess only the vaguest ideas of the reasons why their own engineers and the engineers of coal companies recommend certain coals for particular conditions. The executive must approve coal purchases, often through a purchasing department under his jurisdiction. Such purchasing departments are subjected to much pressure by the coal companies who want to sell coal, hence, in view of the large amount of coal used by the paper industry and its importance as a factor in paper production, it would seem that the executive should take considerable pains to see that only established engineering principles are applied to the selection of coal for the plant. The executive, then, will be aided greatly in doing this if he will study those principles, so that when his engineering and purchasing departments talk to him about coal, they will not be speaking in a foreign language.

It is true that in most industries (as T. A. Marsh[1] says) the man who pays the bills knows more about C. O. D. than about CO_2. But paper mill executives are closer to engineering than executives in other industries. So, while the engineer must try to adopt much of the executive's point of view, the results will be even better if the executive at the same time tries to look at things as the engineer does.

No "Rule of Thumb" Will Find the Right Coal

This attitude is particularly necessary in buying for the paper mill the coal that will give the cheapest steam because there is no definite rule to tell what coal that is. No "rule of thumb" is available. Yet by careful analysis of a number of factors it is possible for any paper mill to solve the problem in a satisfactory way. Let us see what some of those factors are and how they affect the selection of the proper coal.

First we must consider the coals available to a particular mill. Next comes consideration of the various items influencing selection of one of those coals to give lowest steam cost with the equipment we have. Then arises the problem of whether changes in the existing equipment might increase the range of fuels that could be used or decrease steam cost still further. After that we have the problem of actually testing the various coals. Then there is the question of selection of fuel for a new power plant.

Why not simply buy our coal on the basis of lowest cost per million British Thermal Units delivered? Well, that is a very good indicator of low cost usable

coal. But, as we shall see, that indicator must be used with care.

In attempting to select a coal for an existing plant that will give the cheapest steam, a tabulation first should be made of all the coals available in that market. Data on each coal should include its important characteristics, delivered cost per ton and delivered cost per million B. t. u. For a rational and satisfactory selection, all the possibilities should be investigated. Then, as Marsh[3] points out, each of these coals must be studied.

Table I shows important data[2] regarding coals available in various parts of the United States. Table II shows a tabulation[3] of characteristics and costs as made by one plant in analyzing its coal problem.

Each coal available should be studied carefully in regard to the following points:

Primary operation—ability to carry the plant load; responsiveness to sudden load demands and load changes; adaptability to firing equipment; fusion and melting temperature of ash; heating value; commercial size. All these factors are related to reliability of steam supply.

Economy—cost, based on units of 1,000 lb. of steam, of coal, labor, ash disposal, maintenance, capital charges if equipment changes are required.

Table I. Sources and Composition of typical coals of the United States.

Sources	Carbon	Volatile	Moisture	Ash	B.t.u. per Lb.
Anthracites					
Lehigh Valley	75.20	7.36	1.44	16.00	12,423
Cross Creek	89.19	1.96	3.62	5.23	13,723
Arkansas	74.49	14.73	1.52	9.26	13,217
Semi-Anthracite					
Wilkesbarre	88.90	7.68	....	3.49	14,199
Semi-Bituminous					
Cumberland	68.19	17.12	....	13.98	15,500
Clearfield	71.82	22.52	0.76	3.99	14,950
Pocahontas	73.65	18.30	0.80	7.25	15,780
Georges Creek	74.31	18.52	0.59	6.58	13,812
Bituminous and Sub-Bituminous					
Alabama	48.30	42.76	3.01	5.93	14,017
Colorado	47.16	42.43	3.93	6.48	13,797
Streator, Ill.	40.70	33.30	12.00	14.00	10,580
Cartersville, Ill.	52.17	34.11	4.87	8.85	14,150
Brazil, Ind.	50.30	34.49	8.98	6.28	14,550
Iowa	46.64	37.77	5.52	10.07	12,460
Kentucky	58.80	30.60	3.60	7.00	13,544
Cumberland, Md.	73.57	15.47	1.23	9.79	13,305
Ohio	53.15	35.88	8.25	2.72	13,591
Youghigheny	58.40	35.00	1.00	5.60	14,208
Connellsville	63.26	28.71	1.93	6.10	13,881
Wyoming	44.75	33.18	14.42	7.65	12,734
Lignites					
Colorado	45.98	32.71	18.57	2.74	11,360
Iowa	35.60	37.09	8.45	18.86	8,720
Wyoming	36.37	48.43	6.38	8.82	13,440
Montana	22.91	35.34	34.55	7.20	7,090
Arkansas	23.95	37.87	29.73	9.45	12,000

Supplementary performance—storage properties; tendency to cause smoke; tendency to cause fly ash.

Individual selection factors—reliability of the selling company; reliability of supply; mine preparation and sizing; ability of coal seller to provide uniform quality; engineering services rendered by coal seller.

Satisfactory Operation and Cheap Steam

Considering the above factors in order, ability to carry the load comes before everything else. Price, heat value and all the other items mentioned are secondary to this item. Ability to make sufficient steam fast enough to meet sudden load demands is another important item. Some coals are slow burners, others are flashy. These characteristics, together with some of the others mentioned, are related to the question of boiler capacity obtainable. This item of boiler capacity

Table II. Typical analysis of steam costs for a number of coals available to one plant.

Coal Characteristics and Fuel Costs					
Coal	Characteristics	B.t.u. as delivered	Delivered cost per million B.t.u. cents	Coal cost, cents per 1000 lb. steam based on efficiency of	
				70%	50%
A−	Fast, strong coal	13800	18.98	26.31	37.39
B−	" " "	13500	18.49	25.63	35.88
C−	" " "	14000	18.17	25.18	35.25
D		10500	17.85	24.54	34.35
E−	" " "	13200	17.76	24.40	34.16
F	Quality not dependable	11200	17.41	23.93	33.50
G−	Fast, strong coal	13100	17.13	23.54	32.95
H−	Low ash—Flashy	13500	16.60	23.01	32.21
I+	Flashy, fast coal	12000	14.79	20.48	28.67
J	Slow, inert	11000	14.31	19.83	27.76
K	Quality not regular	11000	14.07	19.50	27.30
L	High sulphur	10500	14.04	19.46	27.24
M	Difficult to store well	11500	13.69	18.97	26.55
N	" " " "	11500	13.69	18.97	26.55
O		10000	13.65	18.86	26.40
P		11500	13.47	18.67	26.13
Q+		10800	13.19	18.28	25.59
R		10800	13.05	18.09	25.32
S		11200	13.95	17.95	25.13

is based on operating efficiencies, elimination of banked boilers and ability to carry peak loads without firing additional units; it also affects the number of boilers needed, thus affecting investment cost.

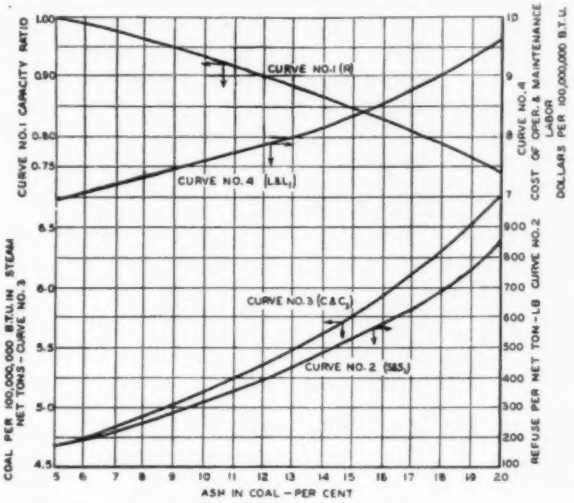
Adaptability to firing equipment is another major consideration in selecting coal to make the cheapest steam. It is generally understood that some coals can be burned satisfactorily on stokers of certain types, while other coals require different types of stokers. For example, coal from Southern Illinois is usually burned best on chain grate stokers; it is not so easy to burn it on other types of stokers. Lignite also is hard to handle on any except chain grates. But anthracite, it is stated, simply will not burn on a chain grate. On the other hand, Kentucky and West Virginia coals, such as are burned by many paper mills, burn well on underfeed stokers.

It is not so generally realized, however, that no stoker will handle with equal facility many different types of coal. Practically all bituminous coals may be burned equally well in pulverized form but not at the same rates of combustion in any given furnace.

Fusion and melting temperature of ash are the items that affect clinker formation in boiler furnaces. If the furnaces operate at a high temperature, say as high as 2,700 or 3,000 deg. Fahr., then coals of which the ash fuses at a lower point than this will cause trouble in both stoker-fired and pulverized-coal-fired furnaces. As

Tobey has shown, in tests to be referred to later, it is really the point at which ash begins to soften that is important, for trouble starts when the ash softens and begins to become plastic.

Sizing of coal is an important item in burning coal on stokers. In most power plants of any size it is common practice nowadays to crush coal to the proper size for the stokers and even to give it a preliminary crushing or breaking before pulverizing. The advantages of sized coal on stokers are well known to combustion engineers. In buying coal, therefore, the pur-


CURVE NO.1 CAPACITY RATIO
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CURVE NO. 3 (C&C2)
CURVE NO. 2 (S&S1)
ASH IN COAL - PER CENT

Fig. 1—Relation of various cost factors to percentage of ash in coal

chaser must make some decision as to how and where the coal is to be prepared for size.

The foregoing comments bring up the whole subject of the value to a given plant of using washed coal of low ash content, as supplied by some coal companies. Here, again, it is difficult to generalize. The curves in Figure 1 show some of the relations[4] between percentage of ash in coal and such items as capacity factor, operating and maintenance labor cost, amount of coal for a given amount of heat in steam and ratio of refuse to be removed per ton of coal fired. The calculation of these costs is difficult. In some cases, ash removal costs are high, in some cases low. Obviously, ash removal cost is an item in steam cost; hence, it should be reduced as much as possible. But it is necessary to evaluate it in connection with other factors.

Figuring Steam Cost

As it is generally understood, the term "steam cost" means the cost of fuel to evaporate 1,000 lb. of steam from and at 212 deg. Fahr. The curves of Figure 2 show costs[1] for various heat values of fuel and various operating efficiencies. These costs are based on coal costing one dollar per ton. To obtain the actual steam cost for a given coal, the cost indicated on the curve is simply multiplied by the actual coal price in dollars. But for a really accurate analysis, labor, ash disposal and maintenance must be figured into the cost of steam. If no physical changes in equipment are contemplated, capital charges, interest and depreciation need not be figured in.

Now, how shall we really determine the steam cost with various coals so that we can select the one that gives the cheapest steam? We can calculate delivered cost per million B. t. u., we can assume various costs and figure which coal ought to be cheapest to use. But the real test is performance.

Coal Should be Tested Under Operating Conditions

After the various available coals have been analyzed according to the foregoing suggestions, the choice will lie among three or four or perhaps half a dozen coals. Each of these coals should be given a real test in the plant for at least 30 and preferably for 60 days, under actual operating conditions. That is the only coal test that is worth making. Short tests of a few days have their value in leading to improvements in equipment and operating methods. But they are of little value for comparing the performance of several coals.

Each coal under test should be burned separately in the regular routine of daily plant operation for 30 days or more. During this time, accurate records should be kept of the costs of fuel, labor and maintenance. Data should be obtained on the performance of the coal under various load conditions and on its banking performance, also on the way it handles in stokers and furnaces and any other pertinent engineering data. The engineering department should supply the mill executives and the purchasing department with these data and should also indicate what relative economical price may be paid for each fuel.

Supplementary Performance Factors

If coal is to be stored, and if there is a possibility that a given coal will deteriorate in storage, such a coal even at a low price may not give cheap steam.

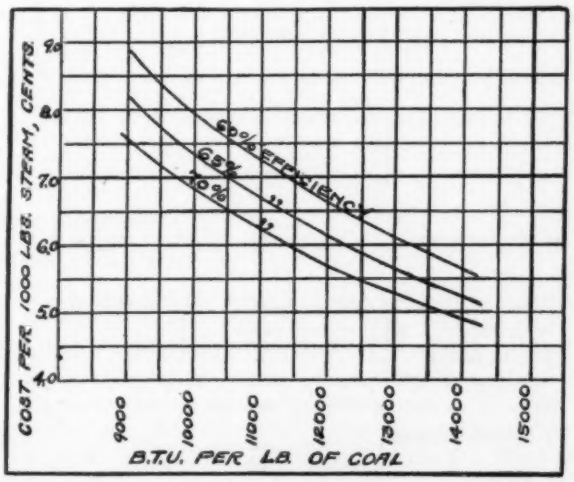

Fig. 2—Fuel costs per 1000 lb. of steam for coal costing $1 per ton and for various efficiencies

Some coals erode in handling more than others. High sulphur content in coal may cause trouble due to corrosion. Some coals store well, others do not. These things must be considered together with the cost and performance data.

Some coals smoke less in certain equipment than in others, although smokeless operation is not inherent in

the coal but rather in the design of the combustion equipment. Coals that produce much fly ash in a pulverized coal plant may be objectionable in some locations, even though they are otherwise satisfactory. In such a case, the cost of cleaning flue gas must be figured in. The engineers of the coal company may be able to suggest minor changes or methods that will make certain coals available where elimination of smoke or fly ash is especially important.

Finally, reliability of supply and maintenance of uniform quality must be considered. It is well for a paper mill to investigate the possibility that several transportation agencies might be able to deliver coal to it, also to calculate the relation of coal storage to transportation. There is little use in selecting a particular fuel only to find that it is not available during certain periods.

Plant Changes and Fuel for New Plants

In the foregoing discussion it has been assumed that no changes are to be made in plant equipment but that a fuel was to be selected that would give the cheapest steam with the equipment installed. But suppose that for one reason or other—need of more capacity, high obsolescence, and the like—plant changes seem desirable. If these changes broaden the range of fuels available, so that there seems to be a chance to cut steam costs, then capital charges must be included in steam costs after the changes are made.

Modernization of existing paper mill power plants and erection of new ones to replace the old has brought the paper industry to the head of the industrial power plant procession. In this process, the question of what coal makes the cheapest steam must be attacked from a different angle. In a great many new boiler installations, the practice has been to select a fuel from those available, determine the steam pressure and steam cycle required and then design furnaces to burn the fuel selected and boilers to absorb the heat generated. In brief, as Van Brunt[5] says, the process is first to determine the coal to be used, then the method of firing, the combustion rate, the grate surface or furnace volume, next the furnace width and size of boiler, the rate of driving, then the type of boiler and the nature of economizer or air heater needed. This process, it will be seen, is one of adapting the equipment to the fuel, rather than the fuel to the equipment. But in either case, lowest steam cost is the criterion. If a fuel is selected, within reasonable limits, the state of the power plant art is such that equipment can be obtained to burn it economically.

Table III. A.S.T.M. Classification of coal according to rank.

Legend: F.C.=Fixed Carbon V.M.=Volatile Matter B.t.u.=British thermal units

Class	Group	Limits of Fixed Carbon or B.t.u. Mineral-Matter-Free Basis	Requisite Physical Properties
I. Anthracitic	1. Meta-anthracite	Dry F.C., 98 per cent or more (Dry V.M., 2 per cent or less)	Non-agglutinating[a]
	2. Anthracite	Dry F.C., 92 per cent or more and less than 98 per cent. (Dry V.M., 8 per cent or less and more than 2 per cent)	
	3. Semianthracite	Dry F.C., 86 per cent or more and less than 92 per cent. (Dry V.M., 14 per cent or less and more than 8 per cent)	
II. Bituminous[c]	1. Low volatile bituminous coal	Dry F.C., 77 per cent or more and less than 86 per cent. (Dry V.M., 23 per cent or less and more than 14 per cent)	
	2. Medium volatile bituminous coal	Dry F.C., 69 per cent or more and less than 77 per cent. (Dry V.M., 31 per cent or less and more than 23 per cent)	
	3. High volatile *A* bituminous coal	Dry F.C., less than 69 per cent (Dry V.M., more than 31 per cent); and moist B.t.u. 14,000[d] or more	
	4. High volatile *B* bituminous coal	Moist[b] B.t.u., 13,000 or more and less than 14,000[d]	
	5. High volatile *C* bituminous coal	Moist B.t.u., 11,000 or more and less than 13,000[d]	Either agglutinating or non-weathering[e]
III. Subbituminous	1. Subbituminous *A* coal	Moist B.t.u., 11,000 or more and less than 13,000[d]	Both weathering and non-agglutinating
	2. Subbituminous *B* coal	Moist B.t.u., 9,500 or more and less than 11,000[d]	
	3. Subbituminous *C* coal	Moist B.t.u., 8,300 or more and less than 9,500[d]	
IV. Lignitic	1. Lignite	Moist B.t.u., less than 8,300	Consolidated
	2. Brown coal	Moist B.t.u., less than 8,300	Unconsolidated

[a] If agglutinating, classify in low-volatile group of the bituminous class.

[b] Moist B.t.u. refers to coal containing its natural bed moisture but not including visible water on the surface of the coal.

[c] Pending the report of the Subcommittee on Origin and Composition and Methods of Analysis, it is recognized that there may be non-caking varieties in each group of the bituminous class.

[d] Coals having 69 per cent or more fixed carbon on the dry, mineral-matter-free basis shall be classified according to fixed carbon, regardless of B.t.u.

[e] There are three varieties of coal in the High-volatile *C* bituminous coal group, namely, Variety 1, agglutinating and non-weathering; Variety 2, agglutinating and weathering; Variety 3, non-agglutinating and non-weathering.

After all the analysis of coal and its testing under actual operating conditions in the plant, we may arrive at some unexpected results. We may find, for example, that coal containing 12,500 B.t.u. as fired and costing $3.60 a ton makes steam for 20 cents per 1,000 lb. whereas a coal containing 10,500 B.t.u. but costing only $3.15 a ton increases our steam cost to 20.70 cents per 1,000 lb.

Or we may find, as one plant did, that a lower priced coal gives the lowest steam cost. The coal consumption was about 30,000 tons a year of coal containing 13,500 B.t.u. per lb. costing $2.79 a ton delivered. A coal of 11,800 B.t.u. costing $2.16 a ton delivered was investigated. This gave a fuel cost per 1,000 lb of steam of 14.9 cents as contrasted with the fuel cost of 14.1 cents per 1,000 lb. given by the first coal already in use. By reducing the comparison to that of fuel cost per million B.t.u. absorbed by the boiler, however, even including installation of some new equipment to make possible the use of the cheaper fuel, the change to cheaper coal decreased the cost of steam and resulted in a saving of $1,400 a year.

Thus, as a result of the analysis, the paper mill may find that it can decrease its steam costs by using a cheaper fuel. Or it may do so with a more expensive fuel. Or a change in equipment may turn the trick. In this connection, it may be of interest to note that at the University of Iowa 23 different coals, all native to Iowa, have been burned on an underfeed stoker. Since Iowa coal is usually referred to by coal burners as "real estate," this is an achievement. It shows that low-cost, low-grade fuels can be burned if we have to do it.

One of the principal discoveries made in these tests with Iowa coal was that different varieties of coal must not be mixed. The same discovery was made at the power plant of the Studebaker Corp. by Julian E. Tobey[6] as a result of a study of coal from 120 mines. Coal was originally received from a composite of 64 sources, hence its behavior on the stoker was erratic. The coal consumption of 700 tons a day warranted such a study. As a result of it, the company abandoned the purchase of coal on a monthly spot market basis and entered into a contract with a single company that could give assurance that it could maintain the quantity and quality of coal needed. As a result, $40,000 was saved the first year the plant operated under this plan. It is mentioned here to emphasize the fact that various types of coal should not be mixed and that for large buyers of fuel, such as many paper mills are, the advantages of a single reliable source of fuel are many, both to producer and consumer.

In conclusion, it should be pointed out that the paper mill executive and engineer can obtain data on coal that will help them in selecting and buying it if they will study the proposed tentative specifications covering the classification of coal by rank and grade, published about a year ago by the American Society for Testing Materials. (Table III.)

Certainly the executive does not need to handle the engineering details involved in making sure that his paper mill is using the coal that makes the cheapest steam. But since he will be forced, whether he likes it or not, to talk to engineers and coal salesmen about coal and to make decisions about its purchase, the more he knows about the subject the better are his chances of getting cheaper steam, hence cheaper paper. There used to be a tradition in the paper industry that it took a ton of coal to make a ton of paper. Of course it does not take nearly that much coal today—probably not more than half a ton, perhaps only a third. The entire industry used over 10,000,000 tons of coal in 1929, according to the Fifteenth Census of Manufacturers of the United States. Moreover, power and steam costs may be from 10 to 20 per cent of the cost of paper production. Thus the whole subject of securing the proper coal, from which is derived so much of the energy that operates the paper mill, should be a matter of primary importance to the executive.

To get the coal that will make the cheapest steam, the paper mill may have to do some experimenting, if it has not already done so. Price alone, heat value alone, type of coal alone mean very little. But when they are analyzed in terms of steam cost and then tested in the power plant itself under normal operating conditions, it is possible at present in any section of the country to find a coal that will reduce the steam costs of a paper mill to the lowest point possible under the existing conditions. And if you ask what that lowest point is, it might not be out of place to refer to a recent comment by W. F. Ryan. "Why waste time," he says, "comparing what you did last month with what you did a year ago? Find out what your equipment is capable of doing and compare today's performance with that."

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Zinc Pigments in Paper Affect Fiber Purity

Consideration of fiber purity in terms of alpha cellulose content and copper number has been recommended by the National Bureau of Standards in choosing record papers that are required to have a long life. It has been found, however, that when papers contain zinc pigments, the test values obtained by the present methods are affected. P. F. Wehmer, chairman of the T.A.P.P.I. Subcommittee on Chemical Methods for Paper Testing has reported that amounts of zinc sulphide commonly used in papers appreciably increase the test values for both alpha cellulose and copper number. Furthermore, that the total acidity value, obtained by titration of an aqueous extract of the paper, is reduced. Until modified testing procedures can be developed to avoid the errors caused by the zinc pigments, the probable stability of papers containing them must be judged in some other way.

Blue Stain Development

in Peeled Shortleaf and Loblolly Pine Pulpwood

GEORGE H. HEPTING, Assistant Pathologist
Division of Forest Pathology, Bureau of Plant Industry[1]

IN THE course of a pulpwood investigation carried on by the Appalachian Forest Experiment Station, a convenient opportunity occurred to make observations on the development of blue stain in peeled shortleaf and loblolly pine. As the question of the possible importance of blue stain in pulpwood does not appear to be settled, it seemed well to get some preliminary definite information on the extent to which pine pulpwood becomes stained and to try to discover some of the factors affecting the extent of staining. The information that has been obtained in this study is indicative only of what might be expected in the species studied under the conditions prevailing during the period the study was made. It would be hazardous to draw too general conclusions from such preliminary information.

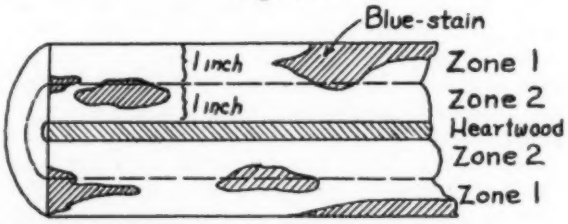
The shortleaf pine upon which data were taken were cut and stacked near Sanford, N. C., in the Piedmont region, and the loblolly was in the coastal plain of South Carolina, near Summerville. The stands from which the wood was cut were second-growth; the shortleaf was approximately 30 and the loblolly 32 years old. There were some older and younger trees in the stands but they did not vary more than a few years in age from the figures given above. Very little heartwood had been formed in either species.

The shortleaf pine was cut from August 8 to 13, and the loblolly from August 29 to September 6, 1934. The trees were peeled by hand either the day they were cut or shortly after, and were cut into 5-foot sections and stacked in pens within a day to about four days after peeling. The author was not present when the trees were cut but has been told that the bark-beetle attack prior to peeling was slight. No bark-beetle galleries were noticed on the surface of the peeled wood. The blue stain that subsequently developed over the surfaces of the peeled bolts and in the sapwood is considered traceable to infections occurring after peeling and not to bark-beetle attack of the unpeeled bolts.

The wood was stacked in pens 5 feet square in a horizontal plane and of varying heights up to about 6 feet. The following are the types of stacking used: (1) pens with no stringers but all full layers, each layer at right angles to the one adjacent; (2) pens with two stringers on the ground, then a full layer, then two stringers, then a full layer, etc.; (3) pens with two stringers, then a layer with the bolts separated a few inches from each other, then two stringers, then another separated layer, etc.; (4) pens with only two bolts to a layer. The shortleaf was penned irrespective of the diameters of the bolts. The pens were placed in a fairly open area of one acre situated in dense woods. Conditions were not favorable for good air circulation and rapid drying. The loblolly was penned using only bolts of roughly the same average diameter in each pen. Some of these pens were placed in a large, open field, and some at the edge of heavily thinned woods, adjacent to the field. Conditions for air circulation and rapid drying were favorable.

Observations on sapwood volume stained were taken at approximately the end of one and one-half months, three months, and five and one-half months. At each of these periods 10 per cent of the penned bolts were split in half. The average diameter of each split bolt and the average diameter of the heartwood in each were recorded. In this way the volume of sapwood per bolt was computed. The percentage of sapwood stained was computed by measuring the number of square inches of stained sapwood on the split surface. By dividing the sapwood into zones, as shown in Figure 1, and then converting the zones into hollow cylinders the area of sapwood stained was converted into volume.

Figure 1



Division of Split Surface of Bolt Into Zones for Conversion of Area Stained to Volume

Relation of Stain Development to Time

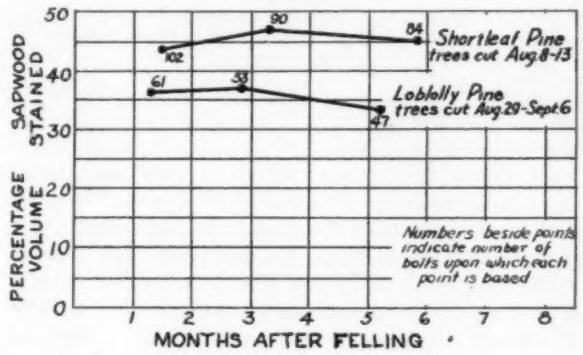
Figure 2 shows that in both species practically all of the staining took place during the first month and a half. At the end of that period 33 per cent of the sapwood volume of the shortleaf bolts and 36 per cent of the loblolly was stained, based on splitting 10 per cent of the bolts. Because of subsequent utilization of some of the loblolly before the last reading was taken, Figure 2 gives the percentages of stain only for those pens which were observed at all three periods. The second reading, at the end of three months, showed a slight increase in stain for both species although this apparent increase is probably within the error of sampling and can hardly be taken to represent a real increase. No significant increase was noted at the end of the third period over the other periods. The apparent decrease in amount of stain from the second to the third reading can be explained in part by the errors of sampling and the use of different sets of bolts for each of the three readings.

No conclusions can be drawn from these data as to whether shortleaf pine stains more readily than lob-

1. In co-operation with Appalachian Forest Experiment Station, Forest Service, U. S. Department of Agriculture.

lolly, because of differences in the weather conditions at Sanford and Summerville. During the first month after cutting, when practically all of the staining took place, the mean temperatures at Sanford, N. C., (shortleaf) and Summerville, S. C., (loblolly) were only 1.2 degrees apart, but the precipitation at Sanford was more than twice that at Summerville. There were only seven days with any rain during the first month at Summerville, while there were eighteen days with rain at Sanford. As moisture is one of the controlling factors in the development of blue stain, the higher precipitation and greater number of rainy days at Sanford may account for the short leaf having had more stain than the loblolly. In addition the conditions for air circulation and rapid drying were less favorable in the case of the shortleaf pens.

Figure 2



Relation of Stain Development to Time

In the shortleaf 58 per cent of the stain was classified as dark in color, 37 per cent medium, and 5 per cent light. In the loblolly 38 per cent was dark, 55 per cent medium, and 7 per cent light.

Stain Development in Inside and Outside Bolts

Table 1 shows that there was litle difference between the percentage of sapwood volume stained in inside and outside bolts. Outside bolts include those at the ends of layers, the top layers of the pens, and the stringers. The figures used as the basis for Tables 1 and 2 and Figure 3 include all of the bolts split at all three periods excepting two pens of short-leaf bolts that were machine-barked, representing approximately 30 per cent of all the bolts penned. 45 per cent of the shortleaf and 30 per cent of the loblolly sapwood was stained. This figure for loblolly pine is lower than those given in Figure 2, because it includes several pens of small bolts that were examined at the second and third readings but were not examined at the first reading, and are hence not included in Figure 2.

TABLE 1

Percentage of Sapwood Volume Stained in Inside and Outside Bolts[1]

Species	Outside bolts		Inside bolts		All bolts	
	Bolts basis	Sapwood volume stained	Bolts basis	Sapwood volume stained	Bolts basis	Sapwood volume stained
	number	*percent*	*number*	*percent*	*number*	*percent*
Shortleaf pine	140	43	136	47	276	45
Loblolly pine	202	30	153	30	355	30

[1]Outside bolts include those at the ends of the layers, the top layers of the pens, and the stringers. All others considered inside.

Stain Development in Different Types of Pens

Table 2 shows that there was very little difference in the percentage of sapwood stained in the different types of pens.

TABLE 2

Percentage of Sapwood Volume Stained in Different Types of Pens

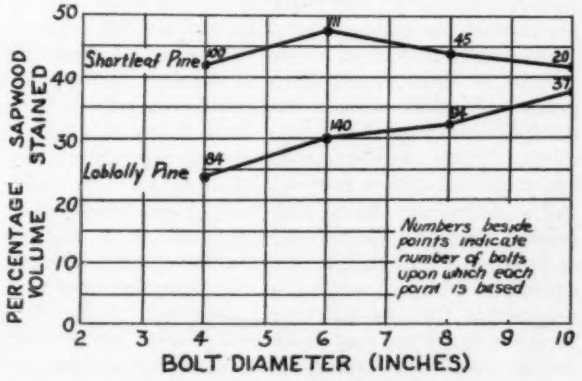
Pen type[1]	Loblolly pine			Shortleaf pine		
	Bolts basis	Average diameter	Sapwood volume stained	Bolts basis	Average diameter	Sapwood volume stained
	number	*inches*	*percent*	*number*	*inches*	*percent*
1	66	6.8	30	.....	.....	.....
2	112	5.7	28	181	6.2	46
3	109	7.2	32	90	5.8	43
4	68	6.8	29	.....	.....	.....

[1]Pen type 1. All full layers, alternately at right angles.
2. Full layers separated by pairs of stringers.
3. Layers with bolts not touching, separated by pairs of stringers.
4. Two bolts per layer.

Relation of Bolt Diameter to Stain Development

Figure 3 shows that in shortleaf there was little indication of a relationship between diameter of bolt and amount of stain, while in loblolly there was a definite increase in the percentage of stain with increase in bolt diameter. The smaller proportion of stained wood in the smaller bolts is probably due to their having dried out more rapidly. Inasmuch as the most weight should be given to the 4 inch and the 6 inch points on the shortleaf graph, this graph also might be said to indicate an increase in stain with diameter. The lack of a well-defined relationship of diameter to stain for the shortleaf may have been due to the generally poor drying conditions for all of the pens of that species.

Figure 3



Relation of Stain Development to Bolt Diameter

Relation of Height Above Ground to Stain Development

Figure 4, which is based only on bolts of approximately the same size (5-7 inches in average mean diameter), shows that the amount of staining was about the same throughout the different layers in the pens. Those points on the graph which deviate the farthest from the horizontal are based on few bolts.

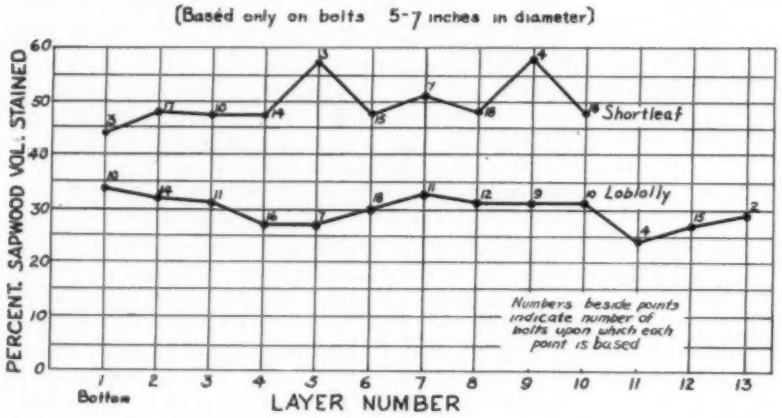


Figure 4

Relation of Stain Development to Height of Bolt Above Ground

Stain in Machine-Barked Versus Hand-Peeled Bolts

As a barking machine was being used commercially at Sanford the opportunity was taken to compare stain development in machine-barked wood as against hand-peeled wood. Two pens of machine-barked shortleaf and two of hand-peeled were erected, with the barking methods represented by alternate pens. These pens were of the same type and the bolts composing them were approximately the same diameter. The barking machine used was of the type that operates by a series of hammers that beat the bark loose so that it falls off.

Combining all bolts split at the three periods for each of the methods of bark removal, 25 machine-barked and 24 hand-peeled, an average of 19 per cent of the sapwood volume of the machine-barked bolts and 47 per cent of the hand-peeled bolts was stained. Based on the standard error of the difference between the amount of stain developed with the two methods of peeling the odds are only one to over a million that the difference was accidental. This indicated a rather marked difference in stain development depending upon which method of bark removal was used. Every attempt was made to have the machine-barked and hand-peeled bolts comparable in all respects other than method of barking, although it is possible that some factor not concerned with the method of removing the bark was responsible for the differences obtained. These differences, however, may have been due to the beating out of some of the water in the outer sapwood by the hammers or possibly to the bruising of the surfaces of the bolts with subsequent rapid surface drying.

A Preliminary Chemical Treatment Test

In order to get some idea of the possible value of the chemical treatment of peeled pulpwood for the control of blue stain, a full pen of 50 machine-barked loblolly bolts of approximately the same size was treated with one of the effective stain preventive solutions used extensively on lumber at Southern sawmills. The treatment was used at a higher concentration than is ordinarily employed at the sawmill. The chemical was sloshed over each bolt with a large brush so that all surfaces were covered with the chemical. A check pen composed of 50 machine-barked untreated bolts was erected alongside. At the end of one and one-half and four months six bolts from each pen were split and examined. Combining the bolts split at both periods it was found that the 12 untreated bolts had an average of 15 per cent of the sapwood volume stained, while the 12 treated bolts showed no stain whatever, except for a trace at the end of one of the bolts. The test was very preliminary in nature and cannot be interpreted as indicating the practicability of stain control treatments for use on pulpwood, but showed that treatments in use at sawmills are also likely to be effective on pulpwood.

Discussion

The proportion of sapwood stained, as measured in this study, did not vary appreciably between inside and outside bolts, between layers, or between different types of pens. This may appear to indicate that methods of piling have no effect on blue stain development. Methods of piling however have been shown to greatly affect the development of blue stain in lumber in the south through their effect on rate of drying. If some of the pulpwood in the present study had been stacked in fairly long or high stacks, in which chances for air circulation varied considerably between the several piling methods, a larger proportion of stained wood might have resulted and differences in stain occurrence might have been evident between the piling methods. However in the present study the fullest pens apparently allowed almost as good air circulation as the most open pens because the pens were small and the layers at right angles to each other. Stacking round wood with layers at right angles results in considerable air spaces between bolts. If the air circulation was not very different in the different types of pens not much difference in the rate of surface drying and rate of blue staining might be expected.

Synthetic Resins

. . . . . for the Paper Industry

SAMUEL S. GUTKIN

RECENT developments in synthetic resins have made possible the commercial manufacture of varnishes with new and novel properties. A review of these developments may be suggestive to paper technologists as the properties of these materials may lead to increasing application in the paper industry.

The common synthetic varnish and lacquer resins are: Ester Gum, Cumaron and Indene, Phenol-aldehyde, Alkyd and Maleic-Rosin.

ESTER GUM

The preparation of ester gum was first described in this country by Schaal (U. S. Patent 335,485; Feb. 2, 1886). Rosin was heated under vacuum to remove the volatile constituents. This was then esterified with about 10 per cent of glycerine to prepare the triglyceride (three moles of rosin calculated as abietic acid and 1 mole of glycerine). Di- and mono-glycerides are formed with 15 and 30 per cent of glycerine respectively. Complete esterification is difficult and free hydroxyl groups are almost always present. This leads to poor water resistance, and cloudiness in lacquer solvents such as ethyl acetate. On the other hand, the alcohol tolerance is increased; thereby inducing better compatability with spirit varnishes like shellac.

Ester gum, or rosin ester, as it is sometimes called, can be made by esterifying rosin with other alcohols. Ethylene glycol rosinate is more flexible at lower temperatures than the glycerol ester.

Uses in the Paper Industry

Cheaper grades of linoleum and lamp shade papers may be hot-impregnated with ester gum. Where a higher degree of flexibility (folding strength) is required, the glycol rosin ester should be used. Ester gum might be used as a rosin soap substitute provided the acid number is sufficiently high so that it is soluble in ammoniacal water. Precipitation of the ammonium soap might be effected in the same way as the sodium rosinate. Ester gum varnishes (ester gum cooked with a drying oil such as tung, perilla or linseed oils and thinned with a mineral spirit solvent) may be used as a surface coating material, but for fast drying a lacquer is recommended.

Where papers are to be used for carriers, packages, or preservers of food products a coating material should fill the following requirements:

Little or no color
No odor (no objectionable odor)
Non-toxicity
Flexibility
Water and grease resistance
Vapor proof
Good slip

An ester gum lacquer containing 35 per cent solids in a solvent mixture of

Toluol	50 volumes
Butyl acetate	30 "
Ethyl acetate	15 "
Butanol	5 "

may be formulated as follows:

Ester gum	2 parts by weight
Cellulose nitrate	1 " " "
Dibutyl phthalate	0.5 " " "
Paraffin	0.25 " " "

In place of paraffin, montan or beeswax may be used. This lacquer is also adaptable for coating wall and window shade papers. For better color retention the ester gum should be replaced with an alkyd lacquer (non-drying) type resin.

The best method of application is to run the paper through the lacquer and remove the excess with knife blades. The coated paper should then be force-dried by running it through a steam-heated chamber. The above and any modifications of the above formula may be applied to the other type resins. Glassine papers may be given increased transparency and gloss by treating them with this lacquer. Novel effects such as crystalline surfaces may be had by adding crystalline materials, such as phthalic anhydride, which are soluble in organic solvents and crystallize upon evaporation of the solvent.

CUMARON AND INDENE RESINS

Cumaron, a water-white, oily liquid with a specific gravity of 1.09 and boiling point of 172 deg. C., is obtained by treating high-flash, coal-tar, naphtha (boiling range, 168 deg. to 175 deg. C.) with sulphuric acid. This monomer, when treated further with sulphuric acid, is converted to the resinous polymer, paracumaron. Cumaron resins vary from liquid to hard brittle resins which are very resistant to chemical attack.

Indene is prepared in a similar manner to cumaron, the only difference being that a coal tar naphtha fraction boiling at 176 deg. to 182 deg. C. is used. Indene is relatively unstable and is oxidized to cumaron at room temperatures.

Uses in the Paper Industry

Cumaron resins cooked with drying oils are used to coat papers for electrical insulating purposes. Where speed drying is desired the resin may be formulated in a nitrocellulose lacquer. Cumaron is unsaponifiable. Therefore its use as an engine size has been difficult. This has been overcome to some extent by emulsifying it with such materials as rosin, stearic acid, certain clays, alkali salts of sulfonated aromatic and naphthenic acids, some saponified resin and soaps.

References: Lender, British Patent 17,576; Dec. 16, 1915
Muth, U. S. Pat. 1,194,866; Aug. 15, 1916
Ellis, U. S. Pat. 1,007,681; Nov. 7, 1911
German Pat. 348,063; Sept. 6, 1918; J.S.C.I. 41, 382 A (1922); U. S. Pat. 1,302,209; April 29, 1919
U. S. Pat. 1,414,670; May 2, 1920

PHENOL-ALDEHYDE RESINS

The phenol-formaldehyde resins are of two types: (1) the Bakelites, the heat-convertible types, which harden with heat and are used for molding purposes and (2) the Novolaks, the non-heat-convertible types, which remain permanently fusible.

The Bakelites are made with an excess of formaldehyde and an alkaline catalyst. The Novolaks are made with a deficiency of formaldehyde and an acid catalyst. The latter can be converted to the former type by adding an excess of formaldehyde and neutralizing the acid catalyst.

The following table compares the stages of both types of condensation:

	Bakelites	*Novolaks*
A. Initial Condensate	Liquid paste, soluble	Saligenin
B. Intermediate Product	Brittle when cold, elastic when hot. Infusible. Swells in acetone	Salertin. Fusible and soluble
C. Final Resin	Infusible polymer of the above	Polymer of above. Fusible.

The unmodified phenol-formaldehyde Bakelite types are incompatible with drying oils but can be made soluble either by cooking with rosin followed by esterification with glycerine, if desired, or by using substituted phenols such as phenyl phenol, xylenols, butyl phenol, etc.

Uses in the Paper Industry

The phenol-formaldehyde resins are second to the cumaron resins in resistance to chemicals and therefore have similar applications in the paper industry. Their greatest use in paper is found in the preparation of laminated products. As an engine size, emulsification is necessary as in the case of cumaron resins.

ALKYD RESINS

Alkyd resins are prepared from polyhydric alcohols and polybasic acids. These fall into two groups: the heat-non-convertible and heat-convertible types. The latter type when modified with non-drying monobasic acids is non-oxidizable but when modified with drying monobasic acids, is the oxidizable type. The following chart shows the raw materials generally used for each type.

I. Heat-non-Convertible Type

Polybasic Acids	*Dihydric Alcohols*
Phthalic (most common)	Ethylene glycol[1]
Succinic (common)	Propylene glycol[1]
Adipic	Diethylene glycol[2]
Sebacic	Triethylene glycol[2]
Azelic	
Camphoric	

1. These form hard resins which soften at or above 60 deg. C.
2. These form soft balsam like resins.
3. Resin fluidity is proportional to the percentage of fatty acid present.

II. Heat-Convertible Type

Polybasic Acids	*Polyhydric Alcohols*	*Mono-basic-Acid-Modifiers*[3]
Similar to list in I. Phthalic Acid is most commonly used. Maleic replaces succinic acid in importance.	Glycerine used almost exclusively. Polyglycerols used incidentally. Pentaerythritol.	A. Non-oxidizable type: Castor oil, oleic, stearic, benzoic and rosin (abietic) acids. B. Oxidizable type: Tung, perilla, linseed, and soya bean acids.

Uses in the Paper Industry

I—*Heat-non-Convertible Types:* These materials, as the name implies, are heat stable thereby adapting the harder grades to hot impregnation. These products, used as coating materials, maintain their flexibility, waterproofness and color with both age and heat.

The following is suggested as an application of a heat-non-convertible resin such as glycol phthalate:

(a)—Melt the resin and maintain the temperature at 100° C. Higher temperature may be used where greater resin fluidity is desired but care must be taken not to scorch the paper.

(b)—Adjust the travel of paper for satisfactory impregnation. This can be determined experimentally (about 1 to 3 minutes).

(c)—Scrape the excess resin off, with suitable doctor blades or squeeze rolls, into the trough.

(d)—If necessary wash the surface with a suitable non-inflammable solvent mixture such as carbon tetrachloride and acetone.

Lampshade paper treated properly in this manner resembles parchment. This method may be applied to other heat-non-convertible type resins such as rosin esters.

II—*Heat-Convertible Types:* Phthalic glyceride was originally used for insulating papers by impregnating them with acetone solutions. The use of modifiers such as castor oil and oleic acid made possible the use of cheaper solvents and the coating became more flexible and water resistant. Drying oil acid modifiers increased the speed of drying, i. e., with siccatives, 1 hour at 100° C. should give a dry film from a resin containing 50 or more per cent of phthalic glyceride. These resins seem to be the best all round substitutes for rosin as an engine size, for casein in coated papers and for glue and water glass in adhesive papers because they can be made soluble in ammoniacal water, if the acid number is over 100 and the resin is in the early cooking stages.

Ammoniacal water soluble drying oil acid modified alkyd resins i. e., linseed oil acid phthalic glyceride, may be used in the preparation of imitation suede and chamois from paper as follows:

(a)—Apply the resin to one side of the base paper either by spray brush or knife. The last is recommended since highly concentrated solutions can be used in contrast to the other methods in which dilute solutions are necessary.

(b)—Pass the paper through a chamber in which colored paper floc is air-suspended. The floc will adhere to the tacky paper surface.

(c)—Force-dry the paper by passing it through a steam-heated chamber.

In other applications the ammoniacal water soluble alkyd may be hardened by substances such as alum and/or formaldehyde. Varnish solutions made from this and other type resins may be used instead. As a precautionary measure carbon tetrachloride should be mixed with the organic solvent thinners in order to reduce the danger from inflammability.

The modified resins are used in lacquers and varnishes in the same manner as the other synthetic resins except that the drying types generally come as complete varnish bodies and further cooking with oils is not necessary.

From the varnish maker's viewpoint alkyd resins are highly desirable because they:

Represent a complete varnish body.
Discolor very little with age.
Are highly durable on outdoor exposure.
Dry through in thick or thin coats.
Reach a dust-free period quickly.
Have high elasticity and adhesion.
May be applied over wet undercoats.

ROSIN—MALEIC RESINS

These resins have been developed recently. They are the addition polymers formed from rosin (abietic acid) and maleic anhydride.

The resin is soluble in ammoniacal water and is used to make oleo varnishes with unusual properties; i. e., retention of ammonia solubility.

Oleo resin varnishes, made by cooking the resin with tung oil and tung oil acids, may be used as adhesives. The varnish may be applied by hot impregnation or in solution with either ammonia water or an organic solvent.

By hardening the oleo resin varnish and by treating it with about 3 per cent zinc oxide during the cooking process a product which is resistant to such relatively strong organic solvents as acetone is obtained. This makes it useful for greaseproof coatings. The hardened oleo resin varnish may be applied by heat impregnation or in solution either in ammoniacal water or in triethanolamine. Increased water resistance is possible by incorporating paraffin. In ammoniacal water solutions air-blown paraffin may be added.

Maleic-rosin esters are prepared in much the same manner as rosin esters. They are decidedly harder and less soluble in drying oils or mineral spirits than the latter. The diethylene-glycol maleic rosin ester, for instance, is a highly flexible product, adaptable for hot impregnation of linoleum papers, while the corresponding rosin ester is soft and balsam-like. This difference is no doubt due to the increased number of reactive groups in the maleic-rosin esters.

Belt Static Prevention*

WAYNE DAVIES, Chief Engineer
Chicago Belting Company

EVERY plant man knows that static electricity is frequently generated by power transmission belts, as shown by the appearance of sparks or a filmy, bluish discharge. It may not be so well known that static electricity annually causes large losses from fire and explosion.

It appears that few have investigated static in belting, and those who have tried to overcome it have usually started from the wrong end of the problem. They have attempted to handle the static charge after it was generated, instead of trying to prevent its formation.

The most practical way to prevent formation of static in transmission belts involves proper drive design, reasonable loads, use of high-quality belting with a good gripping surface, and careful maintenance of belting, bearings, shafting, and other transmission equipment, as well as proper ventilation. In the past many attempts have been made to prevent static charges on drives by the use of a belt dressing in which some electrical conductor was incorporated. Belts have been made with copper ground wires woven into them. These seem to be attempts to cure when the old ounce of prevention would be the most logical remedy.

A leather belt with a high coefficient of friction, operating on a properly designed drive without more than 1 to 1½ per cent slippage, which is barely over the limit of creep, and perfectly natural, will not develop a static charge, if the leather in both plies is treated periodically with neatsfoot oil or dressed with any one of a number of other animal or vegetable oils that will keep the leather in perfect condition and eliminate internal friction.

Where it is impossible to prevent generation of static on transmission equipment, grounds or leaks may be provided to dissipate or absorb the charge. Copper wires attached to machine frames can be grounded to water pipes. Handrails near moving belts can be grounded in the same way. Jack- and line-shaft hangers can be grounded, so that practically no metal parts are left ungrounded for the collection of a static charge.

One of the most practical grounds for machines that are likely to develop static charges can be made from two small, flat pieces of carbon with a thin sheet of pure mica between them. This is a common form of lightning arrester used by the telephone companies. The carbon pieces can be about ¼ in. thick, 2 in. wide, and 4 in. long. The mica sheet should be the same size, and have a hole about 3/16 in. in diameter in the middle. A copper lead wire is secured to one carbon, with the ground wire leading from the other. The two carbons, of course, should be held together, but insulated from each other.

When a charge is carried into one carbon it will cross the gap between the carbons through the hole and leak away in the ground wire without producing sparks.

*An excerpt of article published in the August, 1935 issue of *Factory Management and Maintenance.*

Paper Sketches---

THE FIRST PAPER-MAKING MACHINE TO BE USED WEST OF THE MISSISSIPPI RIVER WAS ONE INSTALLED (1853) IN THE PIONEER PAPER MILL AT TAYLORVILLE, CALIFORNIA.

THE FIRST PASSENGER-CARRYING CRAFT EVER TO RISE ABOVE THE EARTH WAS THE CRUDE LINEN BALLOON BUILT BY THE MONTGOLFIER BROTHERS, PAPER MAKERS OF FRANCE. INFLATED WITH HOT AIR, IT WAS LAUNCHED SUCCESSFULLY ON SEPTEMBER 19, 1783.

AMERICA'S EARLIEST PAPER MAKER, WILLIAM RITTENHOUSE OF GERMANTOWN, PENNSYLVANIA, WAS ALSO THE FIRST MENNONITE MINISTER IN THIS COUNTRY. ABOUT 1701 HE WAS RAISED TO THE OFFICE OF BISHOP.

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BEFORE ALEXANDER THE GREAT PUT EGYPT UNDER GREEK DOMINION, PAPYRUS IS SAID TO HAVE COST GREEK BUYERS THE EQUIVALENT OF $1.00 A SINGLE SHEET.

Nomographs for Rigidity, Stiffness and Softness of Paper

D. S. DAVIS
Dale S. Davis Associates

JAMES d'A. CLARK[1] has described very valuable methods for the determination of the rigidity, stiffness, and softness of paper. In this connection he has defined (1) the *rigidity* of paper as the property of resisting an applied force, (2) *rigidity factor* as a measure of the rigidity of the structure of the sheet and proportional to the modulus of rigidity (3) the *stiffness* of paper as its ability to support its own weight and (4) the *softness* of paper as the feeling of softness when the sheet is crumpled in the hand, which property depends upon the ease of crumpling and the absence of sharp edges in the crumpled sheet.

In addition to describing a sturdy mechanical device for performing the tests, Clark presents a simplified field method which brings these extremely practical determinations within the reach of all. The specimen is cut with parallel edges in each principal direction of the paper and is about 50 mm. (2 inches) wide and over 75 mm. (3 inches) long or as long as may be convenient. "For field tests a threefold pocket rule may be used to give fairly accurate results. The test is made by cutting a parallel strip of the paper, inserting it between two of the folded sections of the rule. Using the third section opened at right angles to the other two as a pointer, and the square edge of the remaining paper to indicate when the sweep of the pointer is through a right angle, the folded section carrying the strip is held in a horizontal position on the edge of a table and rotated." The overhanging length of the strip is adjusted until the specimen just falls through the vertical on being rotated through 90 degrees. The overhanging length is then measured and the caliper and basis weight are determined in the usual manner. The basic caliper of creped paper is measured by means of a dial micrometer using strips of paper cut in the machine direction and about 15 mm. (⅝ inch) wide. A single strip is placed between the jaws of the micrometer which should have a closing pressure of one pound per square inch, and the paper is stretched with the fingers. The minimum reading just before the strip breaks is recorded as the basic caliper.

Rigidity, rigidity factor, stiffness, and softness may then be calculated by means of four formulas. It is the purpose of this brief paper to facilitate these calculations with alignment charts, herein presented. Figure 1 permits computation of rigidity, stiffness and softness while Figure 2 deals with the determination of the rigidity factor. The use of the charts may be illustrated as follows: a sample of stereo tissue with a basis weight of 14 grams per square meter and a caliper (and also, in this case, a basic caliper) of 0.8 of one-thousandth of an inch shows an overhanging length of 7.0 cm. for strips cut in the machine direction when tested as described above. Using Figure 1, connect 14 on the basis weight scale with 7.0 on the length scale and read the rigidity as 0.48 on the R-scale. Connect the basic caliper of 0.8 on the t-scale with the rigidity so found and project the line to meet the S-scale in the value of 53 for the softness. Opposite 7.0 on the length scale read the stiffness as 3.4.

Using Figure 2, connect 14 on the basis weight scale with 7.0 on the length scale and note the intersection with the A-axis. Connect this intersection with 0.8 on the caliper scale and project the line to meet the RF-scale in the value 94 for the rigidity factor.

The equations involved are:

$$\text{Rigidity} = \frac{W L^3}{10{,}000}$$

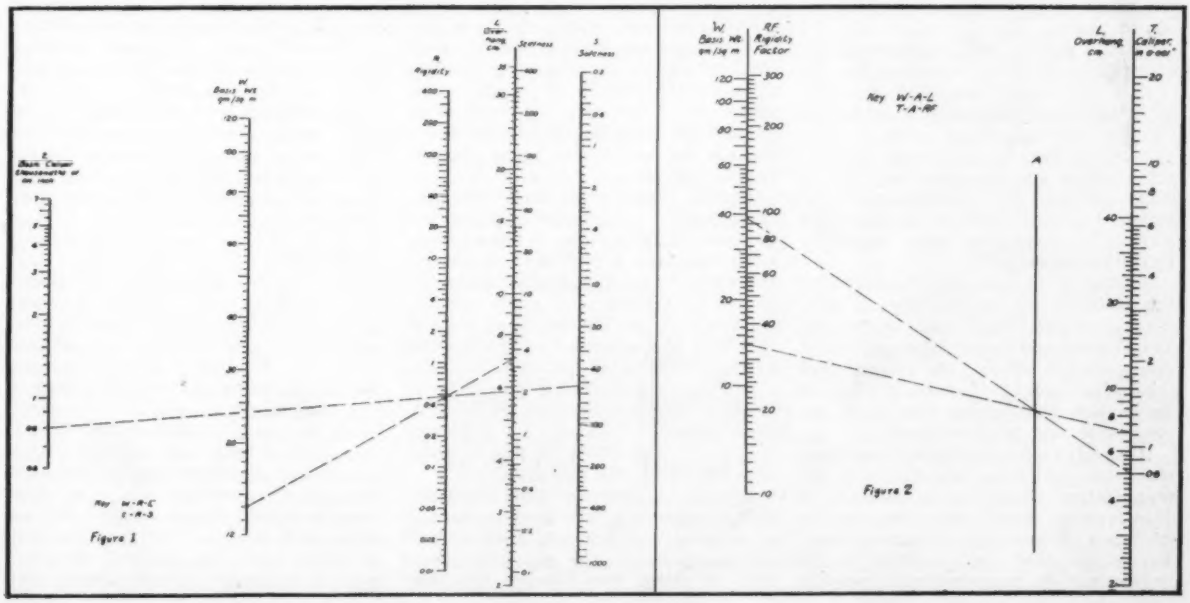
$$\text{Stiffness} = \frac{L^3}{100}$$

$$\text{Rigidity Factor} = \frac{W L^3}{100\, T^3}$$

$$\text{Softness} = \frac{1{,}000{,}000 \log (t+1)}{W L^3}$$

where W = basis weight, grams per square meter
L = overhanging length, cm.
T = caliper, number of thousands of an inch
t = basic caliper, number of thousandths of an inch.

1. *Paper Trade Journal* 100, No. 13, p. 169, 1935.



Animal and Fish Glues

FRED HOLT, JR., Technical Director
Brown-Bridge Mills

TO MOST people glue is a disagreeably odorous, viscous, sticky liquid. Any adhesive which answers their particular purpose is called a glue. This usage of the word is often technically incorrect, for the material in use may be a cement or binding material that is not a glue. It is necessary then, to establish a set of working definitions.

An adhesive may be said to be any material that will join two surfaces under a given set of conditions. Cement, sulphur or ice may be used as adhesives if the conditions are right.

Glue is a material forming a viscous fluid which will yield a highly cohesive and adhesive gell. Into this class fall the animal, casein, albumen, nitrocellulose, silicate, starch, gum and resin glues. Although these adhesives are grouped together, they do not act alike. Some gell when the temperature is lowered, some when it is increased, some by chemical reaction, some by evaporation of the solvent.

Cements should be classed by themselves as suspensions which set to a hard mass of crystals or mixture of crystals and amorphous matter. They are noticeably weak in tension and strong under compression.

So much for definitions. In this article only the group of glues derived from the skins and bones of animals and fish will be discussed.

History

The discovery that the boiling of the hides of animals yielded a fine adhesive dates back at least to the Egyptians. Since primitive man used the hides of animals it is quite possible that glue was made long before our earliest recorded proof.

A stone carving was taken from the ancient city of Thebes depicting the use of glue. This is at least 3,300 years old. In it is pictured the operation of gluing together two pieces of wood. Other parts of the carving show some finished glued pieces and the glue pot. Later, many articles which had been glued together and were still in an excellent state of preservation were found in Egyptian tombs.

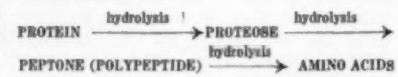
References to glue may be found in the Bible and in several Roman writings. It is also known that the Romans and Greeks had learned how to make glue from fish skins. This was probably the first advance in glue science. Francis Bacon and Shakespeare both have references to glue in their works.

It is only in comparatively late literature that references are found to the manufacture of glue from bones. In 1814, a patent was issued on the treating of bones with acids. Patents issued later than 1850 were mostly on improvements in manufacturing practice to yield better grades. The glues have remained essentially the same.

As with many other products that date from ancient times, the use and manufacture has been an art controlled by rule of thumb methods. It is only in the past few years that scientific principles have been applied.

Chemistry

Animal glues are condensation products of the amino acids. A glue is mostly protein with some proteose and some peptone. These compounds are related as follows:



These proteins are of the albuminoid type. They can be classed further as collagens, jelly forming albuminoids. The glues differ from one another due to the varying amounts of proteose and peptone present with the protein, and to the particular amino acids and their ratios which entered into the formation of the protein. The higher grades of hide glues are nearly pure protein. The bone glues are protein with considerable proteoses.

Fish glues contain chiefly proteoses and peptones with only a little protein. They resemble bone glues more than they do hide glues.

Practically all attacks on the protein molecule result in hydrolysis. Acids, alkalies, steam, and certain enzymes break down the molecule finally yielding the amino acids. This change goes through the proteoses and peptones as shown above.

The proteoses are very similar to the proteins but have less jellying power. The peptones result from further breakdown of the molecule and are definite chemical compounds. It would be expected from this that the hide glues would have the greatest jellying power and the fish glues very little. This is exactly the case.

Twenty amino acids have been isolated from the proteins. Since any grouping of any number of these twenty acids will form a protein, it is easy to understand why it is almost impossible as yet to synthesize a given product. E. Fisher did some outstanding work in this field and succeeded in synthesizing a polypeptide of 18 amino acid groups . . . an octadecapeptid viz. l-leucyl-triglycyl-l-leucyl-triglycyl-l-leucyl-octaglycyl-glycine, having a molecular weight of 1,213. This showed considerable analogy to the peptones.

Due to the presence of certain amino acid groupings it has been found that proteins will yield colored products with certain reagents. The most widely used test is called the "Biuret Reaction" since the test is also given by Biuret (NH_2. CO. NH. CO. NH_2). A solution of protein made alkaline with sodium or potassium hydroxide gives a violet color when a dilute solution of cupric sulphate is added. This is positive with proteins, proteoses and peptones.

When proteins are boiled with nitric acid they are colored yellow. This is called the "Xantho-protein" reaction.

Million's Reagent (mercuric nitrite and nitrate) colors proteins red.

Since these reactions are each specific for a certain atomic grouping, other compounds may react positively with one of the tests. It is wise therefore to use more than one reaction when testing for protein.

Animal glues are not soluble in cold water. They absorb the water and swell. After a particle is completely wet to the core it will dissolve if the temperature is raised to 140 deg. Fahr., forming a colloidal solution. If the temperature is dropped after solution, the viscosity will increase and the mass will form a stiff jelly at room temperature. Since bone glues have more proteose their jellies are not as stiff as those of hide glues. Fish glues, having little protein remain liquid in a 50 per cent solution at room temperature. These fish glues will remain liquid until the temp. is lowered to about 40 deg. Fahr. If the gell is not allowed to dry out it will always reliquify when the temperature is raised.

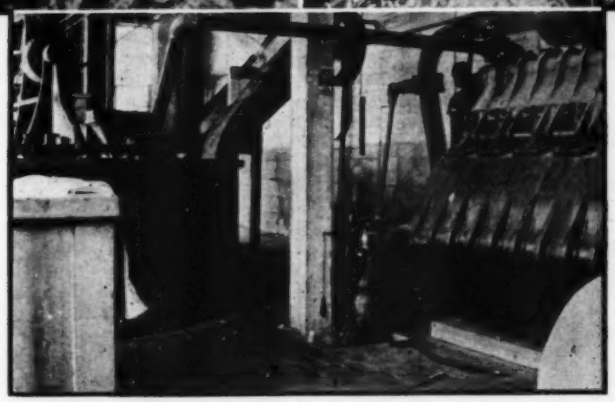
Animal and fish glues are not soluble in most organic solvents. They will dissolve in a very few organic compounds. Dried glue films can be made insoluble by adding formaldehyde, paraformaldehyde, mercury bichloride, or potassium dischromate to the solution. If the dischromate is used it is necessary to expose the glue to the sunlight after the film has dried.

The addition of soluble salts to the glue solution changes the viscosity, jelly strength and hygroscopiscity. Each salt acts differently, so that many desirable properties may be accentuated by their presence.

Manufacture

The hides of many different animals such as cattle, sheep, horses, pigs and goats are made into glue. First the hides are washed carefully to remove dirt. Then they are treated with lime water for several weeks to swell the collagen, the glue forming material. When the stock is properly swollen, the lime is neutrallized with acid and the latter excess washed off with pure water. The stock is then cooked with hot water and the dilute liquor drawn off. Another cook is made with fresh water at a little higher temperature. This process is repeated several times. The

Above—Raw material for fish glue



Right—Filtration of extracted glue liquor under pressure

Above—Material is cleaned and desalted in rotary washmills (foreground), then loaded into cookers (background) for extraction of gelatinous contents

liquors are kept separate. In the first cook is the highest testing glue, in the second the next best, etc. After clarifying and filtering, the liquors are then concentrated in evaporators and the concentrate chilled. The jelly formed is cut into sheets, spread on trays, and dried in an oven. The dried glue is then crushed and bagged.

Grease is skimmed off the boiling vats and finds a market as soap material. The residue after cooking is dried, crushed and sold as fertilizer.

Bone glues require only a few days to make. "Green" bones fresh from the packing houses, and old dried bones, are used. They are crushed and washed. The grease can be extracted then or the bones may be run through the plant as they are. They are then boiled, using higher temperatures than for hide stock and the cooks are kept separate. The liquors are then treated as with hide liquors. For some bone glues a short preliminary boiling is done to eliminate most of the grease. Sometimes the grease is extracted with a solvent, leaving the glue almost grease free. This is known as "extracted" glue and commands a little premium over regular bone glue.

Fish glues are made from the heads, tails, skins and bones of cod, hake, cusk and haddock. The skins yield the finest glue and are treated separately. Since these are salted fish residue, the first step is to wash the stock free from salt and foreign material. Then follow the cooking, filtration and evaporation, as with animal glues. In this case, the liquor is concentrated to 50 per cent solids, and preservatives and scent are added. The glue is barreled and ready for market. The refuse when dried and ground is sold for fertilizer and chicken feed.

Testing and Grading Methods

It is not possible to grade glues by chemical reactions. They are all fundamentally the same merely differing in their molecular make up of amino acids ratios and in their amounts of protein, proteose and peptone.

For successful grading it is their physical properties that have to be tested. The accompanying lists of tests will enable the experienced buyer to judge a glue.

For Animal Glues (hide and bone)

1. Viscosity
2. Jelly Strength
3. pH
4. Moisture Content
5. Foam
6. Grease Content
7. Odor
8. Color
9. Hygroscopicity
10. Adulterants
11. Ash
12. Opacity

For Fish Glues

1. Viscosity
2. Salt Content
3. pH
4. Moisture Content
5. Foam
6. Jellying Temp.
7. Hygroscopicity
8. Opacity
9. Ash
10. Adulterants
11. Color
12. Odor
13. Grease

Glue testing is really a grading of strength. It is analogous to separating a pile of cement blocks, putting the strongest at one end, the next strongest adjacent, etc.

If a standard solution of the glue to be tested, is made, the jelly formed at a definite temperature, and the necessary weight to force a plunger a known distance into the jelly, determined, its resistance to this force can be compared to the resistance of jellies of other known glues. Since it is possible to increase or decrease this jelly strength by certain chemicals, this test is not enough on which to judge the material.

The viscosity of a standard solution is a valuable test when considered together with the jelly strength. The highest grade hide glue has the highest jelly strength and highest viscosity. The highest grade bone glue ranks a little above the lowest grade hide glue. The lower grade bone glues are far below the hide glues in strength.

The pH determination indicates the care exercised in the manufacture of the glue. There is a normal pH range for each grade of well made glue. If the pH is beyond the limits it shows the product has been poorly handled at some stage of manufacture. It has been found also that the jelly strength of a glue changes with the pH. From a pH of 1 the jelly strength increases to a pH of 8. This is the highest strength point and from it the strength drops to a pH of 11. At a higher pH than 11 the standard solution will not gell at the testing temperature.

Foaming in glue has to be killed as much as possible. Too much foaming causes uneven and bubbly coats. Proteoses and peptones foam more than proteins, so the lower the grade glue

the more foaming tendency. Alkali tends to form soaps with the grease in the glue, increasing the foam. Some oils decrease foam, others have no effect. Acids will decrease foam but also hydrolize the glue. Insoluble material increases foam, soluble salts have no effect.

High grease is undesirable because it lowers the adhesive strength, and if there is a large excess grease, will cause a spotty glue coat. The more grease in a glue the less the glue will foam.

A well made glue will keep a sweet clean odor in solution for 48 hours at room temperature. At the end of this time there should be no suggestion of putrefaction. The color will vary according to the grade and source of stock. Glues can be bleached to meet any color requirement.

Mineral adulterants show up in the ash content. Soluble salts and softeners are sometimes added. A chemical analysis is necessary for their determination. There have been cases where materials of an adhesive nature, but lower in quality, have been added to glues, but these are rare today.

Since fish glues are sold as 50 per cent solids and do not have the jellying characteristics of animal glues, no jelly strength test is made. The viscosity test assumes a greater importance. With a set of normal fish glues the viscosity rises directly with the grade. The salt content should be low. This is an important test, since too much salt makes the glue hygroscopic and lowers the strength. A pH test will show up any abnormalities in manufacture. The jellying temperature of the glue solution is an important guide to the quality. A high temperature shows poor manufacture, a low grade glue, or the addition of adulterants. Well made glues have a light golden brown color and should be nearly transparent. Sometimes minerals are added which make the glue opaque and lighten the color. These glues should be low in grease and ash.

Since the requirements of the glues differ with their uses for each consumer certain tests will assume an abnormal importance. The color, the grease content, the odor, which are of general minor importance, may become the deciding factor for some particular use.

Handling of Glue

Animal glue should be given as much soaking time as possible in cold water and then heated to 140 deg. Fahr. The glue will dissolve completely at this temperature. The agitation should be thorough but not fast enough to "whip" the glue. Whipping causes the entrainment of air and makes foamy glue.

The temperature should not be raised above 140 deg. Fahr. If the glue is heated above this temperature for any length of time, its gell strength will drop rapidly. Another good feature of the range 130-140 degrees is that bacteria do not propagate in the glue. If the solution is kept at a lower temperature, bacteria will kill the strength of the glue.

It is good practice to make up only a sufficient amount of glue for the day's use, and to clean the equipment thoroughly every evening. This includes brushes, rollers, etc. Another important point is to weigh all ingredients of the glue solution. The specific gravity of the glue solution can be checked with a hydrometer. It is always possible from this to add make up water to replace any that has evaporated.

Fish glue comes in barrels and always can be measured volumetrically. It is generally well protected from decomposition by preservative, so that if a barrel is left open only evaporation of water has to be watched. Since fish glue is already in solution it does not require soaking but can be mixed into another solution or applied directly, as the case may be.

Glues should be stored in cool, dry places to prevent decomposition.

Differences

Animal and fish glues differ from other adhesives in many respects. Since animal glues will jell by merely cooling to room temperatures, a temporary bond between two surfaces is set up very soon after application of the glue. The bond is then further strengthened by the drying of the gell to a hard colloidal mass.

This quick temporary bond makes animal glues very different from most other adhesives which require drying before a strong bond is set up.

Animal and fish glue films are readily remoistened with water. These films will remain in good condition almost indefinitely, the author having seen a piece of gummed paper that was 17 years old on which the glue was in perfect condition.

Applications

In paper manufacture, glue is used in several different ways. Many wallpapers incorporate animal glues as a binder for the mineral fillers and for the ground colors. These colors when applied are known as "pulp colors." The glue for this use must be clear hide glues and have low viscosity. Some users prefer low grease, others high grease. For binding mineral constituents low grade bone glues are used.

Papers are sized with glue, sometimes in the beater, but mostly as top sizing during drying of the sheet. Clear high grade bone glues or low grade hides are used for this purpose. Glue is also being used as a binder in coated papers although it has been replaced largely by casein. Gummed paper, sandpaper, and paper boxes are only three of many important products in which animal and fish glues have an important role. Fish glues by themselves are used a great deal by paper converters, box plants, etc. In fact, the uses of animal and fish glues are almost innumerable and are increasing from day to day.

Acknowledgment is given to E. R. Edson of the Russia Cement Company for the helpful suggestions and illustrations used with this article.—*Author.*

◆ Herbert Dean Banta

The passing of Herbert Dean Banta, personnel manager of the Hoberg Paper & Fibre Company, Green Bay, Wisconsin, has been felt deeply by his many friends and acquaintances throughout the industry. Mr. Banta passed away August 9 at the home of his sister, Mrs. Mary McLaughlin, on Shawano Lake, Wis., where he had been ill most of the summer. He was 56 years of age.

Mr. Banta was born in Chase, Wis., and came to Green Bay in 1907, joining the power house crew in the sulphite mill of the old Green Bay Paper & Fibre Company. When the paper mill was erected in 1912, he was promoted to power plant superintendent, and upon the consolidation with the Hoberg mill in 1922, he was made superintendent of power for both plants and served in that capacity until promoted to assistant general superintendent. About a year ago, he was made personnel manager, which position he held at the time he was compelled to give up his work about two months ago.

Mr. Banta was perhaps best known for his activites in safety work. He had been one of the leaders in the Paper and Pulp Section of the National Safety Council for several years, and at the annual congress last October was elected general chairman. He had anticipated with fervent interest the next annual congress to be held at Louisville, Ky., in October, at which time he would have presided over the meetings of the Paper and Pulp Section. His co-workers and associates in the section, feel a personal loss in his passing. He was faithful, conscientious and wholehearted in every part of the work where he could be of service. Mr. Banta was also president of the Brown County (Wisconsin) Traffic Safety Council.

Surviving are the widow, four sons, all living at home; three sisters and three brothers.

◆ John Lundrigan Retires from International

Announcement has been made that John Lundrigan, familiar figure at many safety conventions and father of the safety movement within the International Paper Company's mills, has retired from active service with the International Company.

George J. Adams has taken over Mr. Lundrigan's duties in addition to other work carried on by him. Mr. Adams is now designated as Industrial Supervisor of the International Paper Company.

◆ THE AMERICAN MANAGEMENT ASSOCIATION will hold its Sixth Packaging Exposition March 3-6, 1936 at the Hotel Pennsylvania in New York, according to an announcement by Alvin E. Dodd, executive vice president of the sponsoring organization. The exposition is being held in New York for the first time since 1934, the 1935 show having been held in Chicago.

◆ Munro Heads Flambeau—Expansion Planned

W. A. Munro, formerly general manager of the Flambeau Paper Company, Park Falls, Wis., has been made president.

Mr. Munro states that the company is putting in equipment to make higher grades of paper, such as groundwood books, high grade groundwood writing, and papers with a certain amount of bleached sulphite in them.

The company also has begun construction of a water filtration plant. The contract has been placed with the Permutit Company, who expect to complete the plant in November. The plant will have 8 horizontal pressure filters of large size having a total rated capacity of 5,000,000 gallons per day. The chemical feed arrangement is considered to be one of the most accurate types of its kind on the market and is capable of adjustment to suit the seasonal variations of the river water.

◆ BRYANT PAPER CO., Kalamazoo, Mich., announces that John W. Powell is now a member of its sales force.

◆ Champion Companies Vote Consolidation

One of the most outstanding transactions occurring in the industry for some time is the recently announced consolidation of the Champion Coated Paper Co., Hamilton, Ohio, and its associated company, the Champion Fibre Co., Canton, N. C.

The new company is known as the Champion Paper and Fibre Company. Executive offices will be located at Hamilton.

A New York banking company is offering for the new company $5,500,000 of 4¾ per cent sinking found debentures, priced at $100, due 1950. Holders of outstanding preferred stock of the Champion Coated Paper Company and The Champion Fibre Company have been given the right to exchange their holdings for 6 per cent cumulative preferred stock of the new Champion Paper and Fibre Company.

The management of the new company is as follows: Chairman of the board, Alexander Thomson; president and director, Logan G. Thomson; executive vice president and director, Reuben B. Robertson, Sr.; vice president and director, Herbert W. Suter; vice presidents, Reuben B. Robertson, Jr. and Clarke Marion; secretary-treasurer, Scott Zoller; controller and assistant secretary, J. L. Henson; assistant treasurer, Charles S. Bryant; assistant secretary, Walter J. Damtoft; directors, H. T. Randall, C. C. Benedict and H. G. Pounsford.

Twenty-Fourth Annual Conference of Hammermill Agents

Hamermill sales and advertising plans for the coming year were discussed during the twenty-fourth annual Conference of Hammermill Agents held Thursday and Friday, August twenty-second and twenty-third, in Erie, Pennsylvania, home of the Hammermill Paper Company.

To attend the two-day meet one hundred and twenty-one paper merchants from all sections of the United States traveled an average of 1,176 miles each. Also present were representatives of Hammermill's export distributors, including Walter J. Kelly, who journeyed from Shanghai, China, where he is manager of Muller & Phipps (China) Ltd.

After the address of welcome by Ernst R. Behrend, president of the Hammermill Paper Company, who presided at the meetings, Bruce Barton, internationally-known writer and advertising man, spoke to the group. Mr. Barton expressed confidence in a bright business future, explained that "people with courage who keep working and helping themselves will come through as they have always come through."

Other speakers at the gathering included Norman W. Wilson, first vice president and general manager of Hammermill, Harrison R. Baldwin, vice president in charge of sales, Donald S. Leslie, vice president and assistant general manager, A. Ellis Frampton, advertising manager and assistant manager of sales, J. Fred Wuenschel, Pacific Coast sales manager, and E. V. Johnson, vice president and general manager of United States Envelope Company, Springfield, Massachusetts.

Plans for the business program of the meeting were made by the Agents' Advisory Committee and mill officials, who met at the home of E. R. Behrend, Wednesday afternoon, August twenty-first. Members of the Advisory Committee present were: Chairman W. N. Stetson, Jr., Storrs & Bement Co., Boston; John D. Swigart, Swigart Paper Co., Chicago; E. W. Julian, Western Newspaper Union, Omaha, Nebraska; J. Nacht, Union Card & Paper Co., New York City; R. W. Roehm, Beecher, Peck & Lewis, Detroit; R. S. Johnston, Old Dominion Paper Co., Norfolk, Virginia; Norman W. Fort, The Thomas W. Price Co., Philadelphia; H. T. Newell, Jackson Paper Co., Jackson, Miss.; P. A. Stuhlreyer, Diem & Wing Paper Co., Cincinnati, Ohio; V. E. Hecht, Zellerbach Paper Co., San Francisco, California.

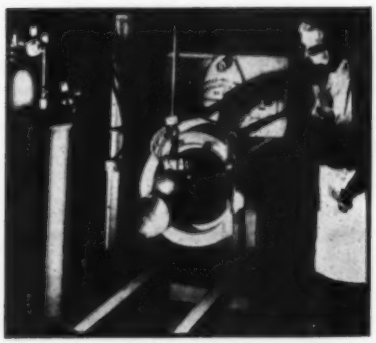
Immediately after the Friday morning session the agents elected members to fill expired terms on the Advisory Committee and the Advertising Committee. Newly elected members to the Advisory Committee are W. N. Gillett, Chicago Paper Co., Chicago, Illinois, Chairman; C. A. Esty, Carter, Rice & Co., Boston, Massachusetts; I. W. Carpenter, Jr., Carpenter Paper Co., Omaha, Nebraska.

New members on the Advertising Committee are S. T. Jones, Hudson Valley Paper Co., Albany, New York, and R. W. Roehm, Beecher, Peck & Lewis, Detroit, Michigan.

Meetings of the conference were held during the morning of each day at the Kahkwa Club. Both afternoons were given over to golf and other sports in which the visiting agents competed for prizes given by Hammermill.

◆ Pipe Cutting Machine

A new machine for cutting pipe intersections has been announced by Oster-Williams, 2057 East 61st Place, Cleveland, Ohio. This machine, designated as No. 212, duplicates in design any pattern which is required to do practically any kind of a pipe welding job without using any cams, templates or special fixtures, and the finished surface has the appearance of a lathe tool cut. It will cut any size of pipe from 2-½ to 12 inches, making full size tees or reducing tees 90 degrees, branch re-



ducing tees 45 degrees to 90 degrees, elbow, miters, Y's and blunt bull plugs, as well as hole cutting.

The machine is somewhat similar in appearance to a radial drill press. The generating case which is made of aluminum is mounted on a rotating column which can be swung in any direction and readily positioned to the end or side of the pipe for the various cuts. The pipe is placed on ball bearing rollers, housed in adjustable supports resting on double rails mounted on the welded steel base of the machine.

Oster-Williams will gladly send more detailed information about the machine on request.

◆ Oil-Immersed Magnetic Starter

A new line of oil-immersed magnetic starters of the reduced-voltage, auto-transformer type, in which all arcing contacts are six inches under oil, has been developed by the General Electric Company, Schenectady, N. Y. Also mounted in the oil is an induction-type temperature overload relay. Either current-limit or time-limit acceleration is available, and an ammeter attachment can be supplied if desired. Ratings range upward to 600 amperes at 600 volts and 200 amperes at 2,500 volts.

◆ Lightweight Refractory Concrete

A new type of Firecrete for casting lightweight refractory concrete on the job has just been announced by Johns-Manville, 22 East Fortieth St., New York City. This new product, known as L. W. or lightweight Firecrete, is composed chiefly of high alumina clay calcined at high temperatures. The resulting concrete is said to weigh only 75 lb. per cubic foot and that its shrinkage, under continuous operation at 2400 deg. Fahr., is so slight as to be entirely negligible. It also is stated that the material has withstood most severe alternate heating and cooling tests without spalling; that it can be put in service after 12 to 24 hours of air-curing; and that it is particularly recommended for casting lightweight refractory shapes and for furnace doors and floors.

◆ Automatic Adjustable Orifice

An adjustable orifice, which automatically shifts its position in accordance with major changes in rate of flow is a new development of Bailey Meter Company, Cleveland, Ohio. This orifice is similar in appearance to a hydraulically operated gate valve. The gate, however, is a sharp edged orifice segment which rests in either one or two definite positions. The piston which positions the orifice is actuated by a solenoid operated valve, which in turn is commanded by contacts made in the recording meter. Under an increasing flow condition, the orifice shifts position at a higher rate than it does under a decreasing flow condition. This overlap prevents constant shifting when conditions are such that the flow holds closely to the changeover point.

◆ Bearing Sizes Extended

The Norma-Hoffmann Bearings Corporation of Stanford, Conn., announced recently that its "Greaseal" line of Felt-Protected Precision Ball Bearings had been extended to include three larger sizes—40, 45, and 50 millimeter bore. The "Greaseal" line includes three series: "7000," with single felt seal; "7000-P" with single felt seal and plate shield; and "77000," with double felt seal. The two latter series are fully enclosed, for the retention of lubricant and exclusion of dirt and moisture. All three of these "Greaseal" types are self-contained units.

◆ Seven-Ton Mobile Crane

A mobile crane with a lifting capacity of 13,900 pounds at 12-foot radius has been announced by the Bucyrus-Erie Company, South Milwaukee, Wis. This crane, designated as CT 50, utilizes a Caterpillar Diesel or gasoline tractor with specially modified crawler mounting as its base. The arc of swing of the crane is 240 degrees. This crane is suggested by the manufacturer for the loading of logs and for general industrial use where the work involves lifting and moving of loads weighing under seven tons.

◆ Folding Endurance Tester

A new motor driven folding endurance tester has been announced by the Amthor Testing Instrument Co., 10 Leo Place, Brooklyn, N. Y. The mechanism and motor of the tester are housed in a steel cabinet for protection against dust, rust and damage when not in use. The specimen under test is held under standard tension by two jaws of the floating type which are kept in horizontal alignment by frictionless supports. A reciprocating blade double folds the paper until it breaks. The number of double folds is progressively registered on a four figure counter which provides easy and errorless readings. When the specimen breaks, the counter is instantly disengaged and the motor stopped. A descriptive circular of the instrument will be supplied by the manufacturer upon request.

◆ New Jordan Filling

A new wood and steel Jordan filling, known as the Hydro-Truss Filling, has been put on the market by John W. Bolton & Sons, Inc., Lawrence, Mass. The name, Hydro-Truss, is derived from the fact that the filling is built up under hydraulic pressure and has internal steel truss construction. It is claimed that this type of construction gives added strength to the filling and increases its length of useful life. With the Hydro-Truss Filling it is said to be possible to get exactly the knife spacing that is required for any particular type of Jordaning.

◆ Illumination Analyzer

A new illumination analyzer consisting of a light meter and combination volt-meter-ammeter with suitable cable extensions, switches and plugs in a compact case for making a complete illumination analysis is announced by Westinghouse Electric & Manufacturing Company. With the illumination analyzer the watts input to the lighting circuit can be measured by taking a reading of current and voltage. The light output can be measured with the

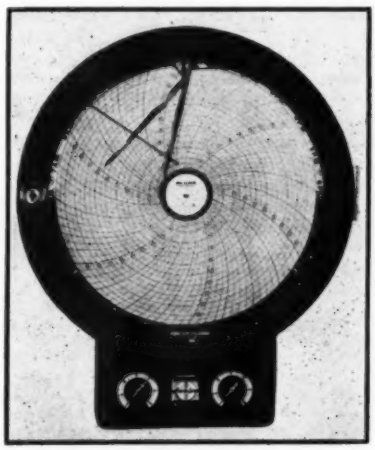
Photox cell foot candle meter supplied as part of the unit.

The cell, which has a color response like the human eye, is mounted on a paddle which is provided with a handle so that it can be held in any position without disturbing the analyzer. The cell unit is connected to the microammeter by a flexible cable equipped with a plug and receptacle, thus providing for additional cable lengths when desired. The microammeter is calibrated directly in footcandles. The scale range of the light meter is 0-50 foot candles.

◆ Air Operated Controllers

The Brown Instrument Company, Philadelphia, Pa., has announced a new and complete line of recording and indicating air operated controllers for temperature, flow, pressure and liquid level.

The most outstanding of these is the Brown Air-o-Line, a controller with 1 per cent to 150 per cent throttling range and automatic reset. Throttling range



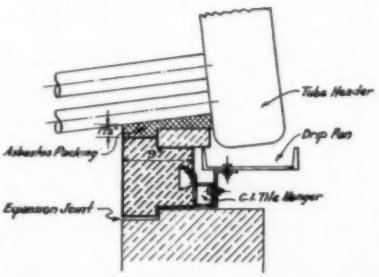
and automatic reset dials are instantly adjustable with a screw driver, without removing the chart plate.

In addition to the Air-o-Line, three other types of Brown Air Operated Controllers are included in the new line. These are, the Brown Full Throttler, a controller with 1 per cent to 150 per cent throttling range and manual reset; the Brown Throttler, a controller with 1 per cent to 10 per cent throttling range and manual reset; and the Brown On-Off Controller, a controller for two-position service.

Catalog No. 8900 describes all types of Brown Recording and Indicating Air Operated Controllers and will be sent upon request. Write the Brown Instrument Company, Wayne and Roberts Avenues, Philadelphia, Pa.

◆ Boiler Tube Header Protection

Geo. P. Reintjes Co., furnace wall contractors of Kansas City, Mo., according to an announcement, have developed a



method for protecting the lower portion of headers and ends of tubes on straight tube type of water tube boilers. This method includes the use of a single belt of supported wall. Tile supporting castings are bolted to the drip pan which in turn can be connected to the boiler column. Such construction is stated to allow free circulation of air around the drip pan reducing oxidation, and at the same time to prevent infiltration of excess air into the furnace at this point.

◆ Machine or Bearing Thermometer

The Ideal Commutator Dresser Co., Sycamore, Ill., utilizing approved bimetallic principles, has developed a thermometer, known as the Ideal Tel-Temp, for indicating machine or bearing operating temperatures at a glance. The dial plate of the instrument is mounted in a dustproof aluminum case and is otherwise protected by a non-breakable crystal and a chromium plated cap. The dial gives temperature readings from 0 deg. to 100 deg. C., the scale having a background of green, orange and red for indicating safe, caution and danger zones. A separate base with a threaded stud that screws into the case is attached with escutcheon pins to machine being equipped. The case has a flexible rubber ring that fits tightly against the machine to keep draughts and outside temperature fluctuation from affecting true reading of the existing temperature condition.

Due to its separate base construction, the instrument can be installed on ma-

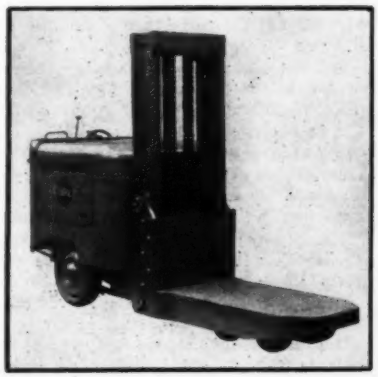
chines as a permanent heat indicator or used for portable testing on any number of machines or bearings. Among the pulp and paper mill applications for the Ideal Tel-Temp that have been suggested, in addition to motors and generators, are calender and main press bearings of paper machines, super-calender bearings, Jordan bearings, grinder bearings, and Jordan shells.

More detailed information on this instrument will be furnished by the manufacturer upon request.

◆ Heavy Duty High-Lift Truck

The Baker-Raulang Company, 2168 West 25th St., Cleveland, Ohio, has announced a new 5-ton truck in which all sharp angles and unnecessary outward component parts are eliminated by placing as much of the control and operating mechanism as possible within the battery compartment enclosure. Hoisting is accomplished by two double alloy steel roller chains each having a capacity of 46,000 pounds. The hoist unit is a quadruple-reduction spur gear unit with all gears of heat treated alloy steel and having all shafts either ball or roller bearing mounted. The motion of the platform is protected at both the upper and lower limits of travel by cut-out control switches and further protection is provided by the use of an over-running clutch in the hoist unit.

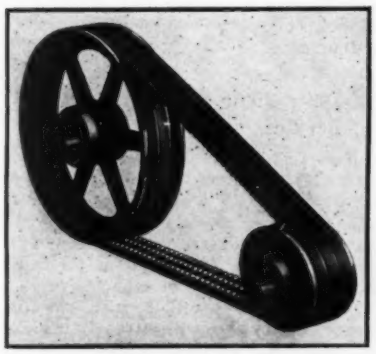
The uprights are 10-inch cast alloy steel channels with 1¼-inch thick web



and flanges. The platform is fabricated of 1¼-inch high-carbon steel lift arms and carriage electrically welded to a diamond-pattern platform plate. The main frame is of ½-inch flame cut high-carbon steel plate; while the underframe is built up of two 1¼ x 5 and two ¾ x 5 high-carbon steel plates. The dual trailing axle is of alloy steel and is fully compensating. Steering gear is of the worm and wheel type actuated by a vertical handwheel. The power axle is a worm drive unit, the same as used on other Baker trucks.

◆ Semi-Steel Pulleys for V-Belt Drives

A complete new line of semi-steel pulleys for use in conjunction with Dayton Cog-Belt drives for all ratings up to 15 hp. has been announced by The Dayton Rubber Manufacturing Co., Day-



ton, Ohio. These pulleys, known as Dayton Day-Steel, are accurately balanced and have all finished surfaces machined to accurate limits of precision work. Catalog 110-C describes and illustrates them as well as the line of cog-belt drives.

◆ Photo-Electric Reflection Meter

Pfaltz & Bauer, Inc., 300 Pearl Street, New York, N. Y., has announced a new photo-electric reflection meter as an addition to their line of testing apparatus. This meter, designed by Dr. B. Lange of the Kaiser Wilhelm Institute, Berlin-Dahlem, consists of a' self-generating photo-electric cell, a micro-ammeter, small Edison storage battery, volt meter, and two rheostats—one to control the potential of the light source and the other to vary the resistance of the micro-ammeter. The entire apparatus is contained in a small hardwood case. Incorporated in the instrument is a rectifier which makes it possible to charge the storage battery with a. c.

The unique feature of the instrument is the design of the photocell. This cell contained in a highly polished nickel case, has a central opening through which the rays from the light source are directed to the surface to be measured. By using a storage battery with a voltage control the potential of the lamp may be accurately controlled.

The micro-ammeter is calibrated in light units and gives direct readings of reflection values in percentage. Likewise, opacity may be determined through the use of white and black plates which are furnished with the instrument. Colored filters are also available for the measurement of various spectral ranges.

◆ New Water-Soluble Resin

A new water-soluble resin, Abopon, has been announced by the Glyco Products Company, Inc., 949 Broadway, New York City. This resin, stated to be a pure, complex, non-combustible, inorganic chemical compound, is an odorless water-white liquid which dries in air to a smooth, non-tacky, flexible, glossy film. It is neutral and non hygroscopic; is more viscous and denser than glycerine; and possesses strong adhesive properties.

Abopon is claimed to have, among others, definite sizing, and glazing properties for paper. It is also stated to be an adhesive for paper and can replace silicate of soda where alkalinity is detrimental.

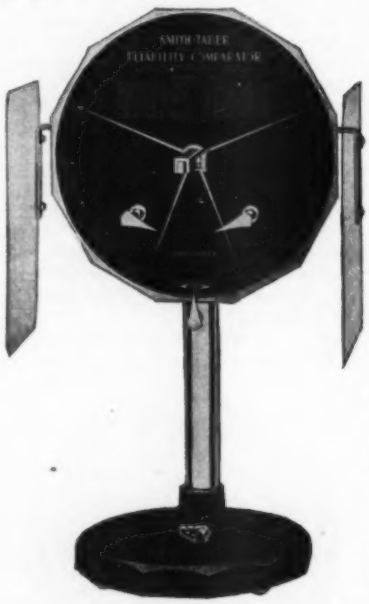
◆ Instrument Rehabilitation Service

The Instrument Rebuilders and Repair Co., 611 Adams St., Hoboken, N. J., have announced a service of complete rehabilitation of obsolete, broken, discarded or inaccurate instruments. This service is said to include a thorough and critical analysis of each instrument when received together with the improvement of every single part that can be improved advantageously and economically and the replacement of the old part with the new. The instrument is then stated to be assembled and placed in operation under closest inspection and checking.

Among the instruments that may be serviced are temperature recorders, pressure recorders, industrial thermometers, pyrometers, gauges, controllers, valves, balances, clocks, counters, tachometers, chronometers, water meters, oil meters, engine indicators, recording micrometers, voltmeters, ammeters, wattmeters, and potentiometers.

◆ A Pliability Comparator

The development of a pliability comparator providing a quick and accurate means of checking and controlling quantitative and qualitative factors relating to pliability of thin papers, transparent wrappings, etc., has been announced by the Smith-Taber Co., North Tonawanda, N. Y.



The instrument is built to precision standards of accuracy and has no delicate parts to wear or lose adjustment during years of laboratory or plant use. It is quick and easy to operate and gives a check both with and against grain of the paper being tested. Construction, operation and uses are described in an illustrated brochure published by the Smith-Taber Co., North Tonawanda, N. Y.

◆ W. A. KELLEY, who for a number of years has been Wisconsin District Manager of the Reliance Elec. & Mfg. Co., Cleveland, Ohio, is now associated with E. D. Jones & Sons Co., Pittsfield, Mass., with headquarters in Milwaukee, Wis.

◆ Crossett Gets Loan from RFC

The Crossett Lumber Company, Crossett, Ark., has definitely obtained from the Reconstruction Finance Corporation a loan of $3,850,000 for the purpose of building a new pulp and paper mill.

Jesse Jones, chairman of the Reconstruction Finance Corporation, issued a special announcement in which he stated that loans for paper and pulp mills were advocated, and the Crossett company's application was passed in the face of bitter opposition by officials of the American Paper and Pulp Association.

The loan is secured by the entire holdings of the Crossett Company, which are conservatively estimated at $12,000,000, nearly three times the amount of the loan. This company controls large areas of timber and pulpwood land, and owns three large saw mill plants. The town of Crossett, with a population of 3,500, belongs to the company. This town comprises about 3,000 acres and the buildings include 685 dwellings with modern conveniences, stores, office buildings, hotel, hospital, theatre, ice plant, and other buildings necessary to the servicing of a town. There are facilities for electricity, water and sewage.

The loan matures in installments ending January 31, 1945. The annual capacity of the proposed plant will be approximately 31,000 tons of kraft paper and 15,500 tons of sulphate pulp.

◆ James L. Carey

James L. Carey, well-known paper and pulp mill engineer, passed away suddenly September 9, at the age of 71 years.

Mr. Carey was born in Menasha, Wis. He attended the University of Wisconsin where he obtained the degree of Mechanical Engineer. After graduation, he entered the paper manufacturing equipment field as sales engineer for Black - Clawson Company, Hamilton, Ohio. Later, he became chief engineer for the American Strawboard and United Boxboard Companies until the year 1908 when he established himself as an independent paper mill engineer, with offices in Chicago. Many of the large, modern paper mills both in the United States and other countries were designed by Mr. Carey.

Surviving Mr. Carey are his widow, three daughters and a son.

◆ Phillips Now General Works Manager of Westinghouse

Appointment of T. I. Phillips, as General Works Manager of the Westinghouse Electric & Manufacturing Company, is announced by F. A. Merrick, President. In his new position, Mr. Phillips will serve as central authority for all manufacturing operations of the Company.

Mr. Phillips has been with Westinghouse since 1915. In the years following his association he has held various positions of executive responsibility in factories of the Company located at Chicopee Falls, Mass., and those of the Pittsburgh district. In 1930 he was appointed Works Manager of the Nuttall Plant of the Company. Three years later he was made Works Manager at East Pittsburgh and has held this position, with other duties assigned him, until this latest appointment.

He succeeds C. H. Champlain, who has been forced by prolonged illness to relinquish his activities with the Company.

◆ New Catalogs and Publications

Alemite Corporation Div., Chicago—This company has just distributed its most modern lubrication equipment manual, the latest Hand Guns and Fittings Catalog. There are 54 pages, with a tab index for each type of Alemite fitting, gun and hose, and for the various accessories of the several highly efficient Alemite systems. There are many illustrations and blueprint drawings. Complete descriptions and prices for all items are given.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—A new leaflet, No. 2203, describes and illustrates this company's line of compact, self-contained speed reducers which have integral or attached motors that permit lowspeed drives with high over-all efficiency. Eight types of the gearmotos for application to various horizontal and vertical arrangements are listed.

Bausch & Lomb Optical Co., Rochester, N. Y.—"Laboratory Microscopes" is the title of a new booklet just issued, in which descriptions and applications of laboratory microscopes and their accessories are set forth. The instruments featured are for use in hospitals, industrial and clinical laboratories, for student and professional use. Accessories and illuminating systems are also described and applications given. There are tables of valuable data and price lists.

John W. Bolton & Sons, Inc., Lawrence, Mass.—A 24-page book gives a pictorial trip through the Bolton factory and shows how strength is built into the fillings. There are full page bleed illustrations showing the various steps in the manufacture of the filling. In addition, there is a description of the Bolton Wedgeless Plug and the Emerson Jordans, which are also products of this company. Copies upon request.

Brookville Locomotive Co., Brookville, Pa.—A new bulletin is devoted to a description of the new series of Brookville Locomotives ranging from 2½ to 6 tons in weight, which have the Ford V-8 engine. These locomotives also employ the Ford four-speed truck transmission and the new Ford heavy duty truck clutch. There is a two-page spread showing a cross section diagram of chassis and motor. A number of illustrations are shown and there is a table of specifications.

General Electric Co., Schenectady, N. Y. —"A Proved Way to Make Better Board at Lower Cost" is the subject of a booklet featuring the G-E auxiliary drives for the wet end of cylinder paper machines. The text covers the reduction of felt costs, saving of steam, increase in production and improvement of product. Several illustrations show actual papermill installations; there are felt-stretch curves and a diagrammatic drawing of the operation of the G-E auxiliary drive on a board machine.

B. F. Goodrich Co., Akron, Ohio—A 4-page booklet on "Pneumatic Tires for Wheelbarrows and Industrial Trucks" has just been published. The booklet contains specification tables and is well illustrated.

Graton & Knight Co., Worcester, Mass. —The performance of this company's Research Leather Belting as gleaned from many actual cases studied has been published in a book called "Performance Book." Actual cases are cited in which savings and increased performances are explained in detail.

Ideal Commutator Dresser Co., Sycamore, Ill.—A new 64-page catalogue lists the entire Ideal Line of products. It gives up-to-date information on commutator and slip ring maintenance—motor and general electrical maintenance. A number of new products have been added to the Ideal Line and are covered in this catalogue. There is also a great deal of data as well as a valuable section giving definition of electrical terms.

Jeffrey Mfg. Co., Columbus, Ohio—In catalogue No. 610, this company has published a compilation of engineering data for reference in designing and estimating belt conveyors. The company's line of conveyors has been standardized, indexed and classified so that by referring to the tables the right conveyor for the job may be chosen and ordered by number. There are dimensional tables that will be of valuable aid to the engineer. Also a section is devoted to the Jeffrey Reliance Belt Idler which has been used on some large national construction jobs. Copies on request.

Lewis-Shepard Co., Watertown, Mass.— A new colored folder, No. 311, just issued, shows by illustration of the company's equipment how to efficiently move, stack or store articles and commodities of every kind.

Lunkenheimer Co., Cincinnati, Ohio— Bulletin No. 504 is descriptive of Kingclip Gate Valves. All types in the line—inside screw, outside screw and quick operating in both iron body bronze mounted and all-iron patters are listed and illustrated, with large sectional illustrations of the various parts.

Medart Company, St. Louis, Mo.—This company has just issued a new General Transmission Catalogue, No. 56-T. This catalogue describes in detail the different types of Medart "V" groove friction clutches, belt tighteners, short center automatic belt adjusters, bicycle type hoisting sheaves, and contains complete data on Manila rope drives. Full sections are devoted to Medart Timken-equipped bearings, straight sleeve and taper sleeve types, together with special unit mountings; Medart Steel rim pulleys and special machinery applications. There are also complete data and list prices on the company's Hercules pulleys, which heretofore have been unpublished. Copies on request.

Metasap Chemical Company, Inc., Harrison, N. J.—A new booklet, "Metallic Soaps—Their Uses and Properties," is said by this company to be the only one of its kind published in the English language. An explanation of what metallic soaps are, methods of manufacture, chemical and physical properties, methods of analysis, and applications in various industries are among the topics discussed. Copies on request.

Norton Company, Worcester, Mass.— Norton Refractory Cements is the subject of a new booklet just issued. The composition and characteristics of these cements is concisely explained as well as instructions for their use. There are a number of interesting tables and technical information as well as a variety of illustrations.

Paper & Printing Digest, 909 Foster, Chicago—The August issue of this publication has been designated as Craftsmen's Number, being dedicated to the spirit of the International Association of Printing House Craftsmen. A copy of the magazine was presented to every delegate attending the association convention at Cincinnati. The first article is an interesting tribute to the Franklin Institute of Philadelphia, an illustration of which appears on the cover of the magazine. There is also an extensive article, "Paper Facts for Printers," by the Publisher and Editor, William Bond Wheelwright, which deals with paper troubles in the Government Printing Office.

Permutit Co., New York City—An interesting piece of literature just released is Bulletin No. 61 entitled "Zeolites, Mining, Processing, Manufacture and Uses" by Eskel Nordell, Technical Department of this company. This bulletin is a reprint of paper presented at the Ninth Annual Michigan Conference on Water Purification and is believed by the Permutit Company to be one of the best, and perhaps the first, paper on the subject that has been published. The booklet contains illustrations of lantern slides originally used when the paper was presented.

Quimby Pump Co., Newark, N. J.—Bulletin C-112 featuring Quimby Centrifugal Pumps has just been received. The features of the Quimby rubber lined pump in which a resilient rubber lining is used permitting expansion and contraction with temperature changes without cracking or endangering the lining in any way are fully explained in this bulletin. Specifications are listed and there is a cross section illustration of the pump showing interior of casing.

Roots-Connersville Blower Corp., Connersville, Ind.—Bulletin 21-B-17 is descriptive of Victor-Acme Rotary Positive Blowers. The power economies that are possible when moving varying volumes of air by the blowers are illustrated by a diagram on page one. Other operating characteristics of known controlled volumes, positive air movement, freedom from internal seal or lubricant, are described along with illustrations of Types "SB" and "AFS". A selection table giving net capacities at listed speeds and pressures is also given.

S. K F Industries, Inc., Philadelphia—This company has just released a 32-page catalogue describing ball and roller bearing transmission appliances. There are load ratings and diagrams of mountings for SKF ball and roller bearing pillow blocks, flanged housings, take-up boxes, post and drop hangers, floor stands, replace boxes, locknuts and lockwashers. Seven pages are devoted to a discussion of bearing problems, aids in the selection of ball and roller bearings and dimensional and load data.

United Conveyor Corp., Chicago—A new catalogue describes this company's Steamatic System which gives any one, or combination of the following functions: (1) Vacuum Sweeping for the power plant; (2) Fly ash and soot conveyor for rear passes, breeching, stack, etc.; (3) Cinder reclaiming—fly ash or cinders with unburned carbon are discharged in the furnace for burning. The catalogue is well illustrated with halftones and diagrams.

Union Steam Pump Co., Battle Creek, Mich.—A folder entitled "A Glimpse of the Plant, the Products and Responsibility of the Union Steam Pump Co." has just been received. This folder is entirely a pictorial presentation of real live numbers from the company's line of products. The company makes pumps for every kind of service and if you do not find the one you seek on this folder, an inquiry will bring a prompt reply.

John Waldron Corp., New Brunswick, N. J.—An attractive new catalogue describes and illustrates the important changes recently made in the Francke Flexible Coupling, and it has been issued coincident with the new sales policy recently inaugurated where these couplings and replacement parts are now offered direct by the company instead of through general sales agents. In addition to describing the changes in the coupling, the new catalogue gives complete tables of sizes, full directions for size selection and coupling service factors. Copies on request.

Yarnall-Waring Co., Philadelphia — A bulletin of interest to power plant engineers who are operating high pressure boilers is B-419 just issued by this company, in which Yarway Forged Steel Blow-Off Valves are featured.

BOOKS

Department of Commerce — Research Paper RP794 entitled "A Study of the Relation of Some Properties of Cotton Rags to the Strength and Stability of Experimental Papers Made from Them" has just been issued in pamphlet form. The authors are Merle B. Shaw, George W. Bicking and Martin J. O'Leary, and the paper is part of Journal of Research of the National Bureau of Standards, Vol. 14, June, 1935. Copies may be procured from the Government Printing Office, Washington, D. C., for 10 cents each.

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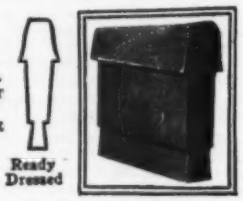

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Were made by this Company in 1922. Their outstanding service is known from coast to coast.

Our Modified Longcrimp is the latest improvement in that type of wires. It has the extra life of the original Longcrimp and can be used for light weight paper.

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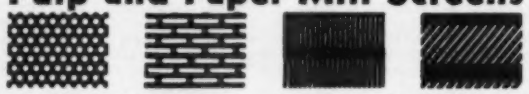

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Perforations that are accurate in size and alignment
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PAPER MILL MACHINERY

For The Papermaker's Library

Papermaking Research Around the World, by Dr. Louis E. Wise.

Identification and Microscopy of Woods and Wood Fibers Used in the Manufacture of Pulp, by Ellwood S. Harrar and J. Elton Lodewick.

Lessons in Paper Making, Part 1, by Harry Williamson.

Lessons in Paper Making, Part 2, by Harry Williamson.

Practical Helps for the Mill Man.

Each one of these publications contains a wealth of information, and they are priced at only fifty cents per copy prepaid.

THE PAPER INDUSTRY
333 North Michigan Avenue
CHICAGO ILLINOIS

◆ T.A.P.P.I. to Visit Laboratories and Chemical Plants

A most generous invitation has been received by the Committee of the Fall Meeting of the Technical Association of the Pulp and Paper Industry from the Paper Makers Chemical Corporation. This involves a special train to Wilmington and Atlantic City, luncheon, and personally conducted tour of the Hercules Experimental Station.

The Philadelphia headquarters will be the Pennsylvania Hotel where those who want to take the Wilmington trip will meet. A special Pullman train is being provided by the Paper Makers Chemical Corporation, which will leave from the Baltimore and Ohio Railroad station, 24th and Chestnut Streets, Philadelphia, at 10:00 a. m. Eastern Standard Time (11:00 a. m. Daylight Saving Time). This train will arrive at the Experimental Station at Wilmington 12:15 p. m. Daylight Saving Time. A nice luncheon will be served shortly after the arrival in the splendid new club house of the Experimental Station.

After the trip through the Experimental Station, details of which will be given later in this article, the special train will leave the Experimental Station at 3:30 p. m. Daylight Saving Time for Philadelphia, where at the North Philadelphia Station it will pick up the ladies who have in the meantime been taking in all the sights of Philadelphia. This train leaves North Philadelphia Station at 4:45 p. m. D. S. T. and will arrive at Atlantic City at 6:00 p. m. D. S. T., leaving sufficient time for everyone to get located in their rooms and be ready for the get-together meeting scheduled at the Ambassador Hotel, Atlantic City, for 7 o'clock.

The Paper Makers Chemical Corporation and its associate concern, the Hercules Powder Company, are going to great lengths in order that the visit of the T.A.P.P.I. members on Wednesday, the 18th of September, will not only be extremely interesting, but convenient and comfortable. A special Pullman car train is being provided to take the membership from Philadelphia right to the doors of the plant and this same train will wait there to take the members to Atlantic City after stopping on the way at North Philadelphia Station to pick up those who decide to make other trips that day.

V. E. Edwards of the Hercules Powder Company will look after all transportation and baggage arrangements as well as the luncheon, so that not a single thought will be necessary to be given to those matters, and the whole time can be devoted to enjoying the interesting things to be seen and heard on this 30-acre station with its 12 buildings and large laboratories.

O. A. Pickett of the Hercules Powder Company is extremely anxious that the T.A.P.P.I. members see as many things as possible that will be interesting to them and tentatively has arranged for demonstrations in various laboratories.

Paper Coating Laboratories

Among those demonstrations on the list is the Mayer Paper Coating Laboratory, and also the Chambers Paper Coating Laboratory. These coating machines can coat with any film forming material, including lacquer, wax, starch, clay and casein, on papers, foils, textiles, boards, etc., in various combinations and laminations. In this laboratory, after the products are coated, they are subjected to tests to determine the resistance against water, grease, oil, vapor, moisture and are also tested for wet strength, odor, taste and adhesion.

Rayon and Explosives

An interesting demonstration will be the wet and dry spinning of synthetic silks. As a large producer of cellulose, Hercules is interested in improving its products and developing more satisfactory materials for synthetic fabrics. The search for new sources of commercial cellulose is carried on continuously.

While the Explosives Laboratory is hardly of immediate interest to any of our members, still it is so interesting that no doubt all will want to look this over. There is, for instance, the explosives impact tester whereby testing a minute quantity of various explosives it can be very clearly shown the wide range of sensitivity between explosives that the layman has been accustomed to always think were instan-

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That's the thing paper-mill men like about ARMCO SPIRAL WELDED PIPE. Whether they order a few lengths or a carload, it's delivered on time, ready to go in fast and economically. Good-bye production delays. And once in service, this pipe *custom-made for paper mills* proves its worth. Light-weight pipe though it may be, it is strong and durable — equal to the job. Its high-flow capacity promotes greater efficiency, while its rolled-steel spiral-welded construction endows it with ruggedness and exceptionally long life. Just mail your specifications both for pipe and any regular or special fittings you may need. You'll find us "quick on the trigger." The American Rolling Mill Company, Pipe Sales Division, Middletown, Ohio.

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Complete power plants to meet any operating conditions of Pulp and Paper mills or other Industrial service. Engineering and Construction.
Satisfactory Services Always Guaranteed.

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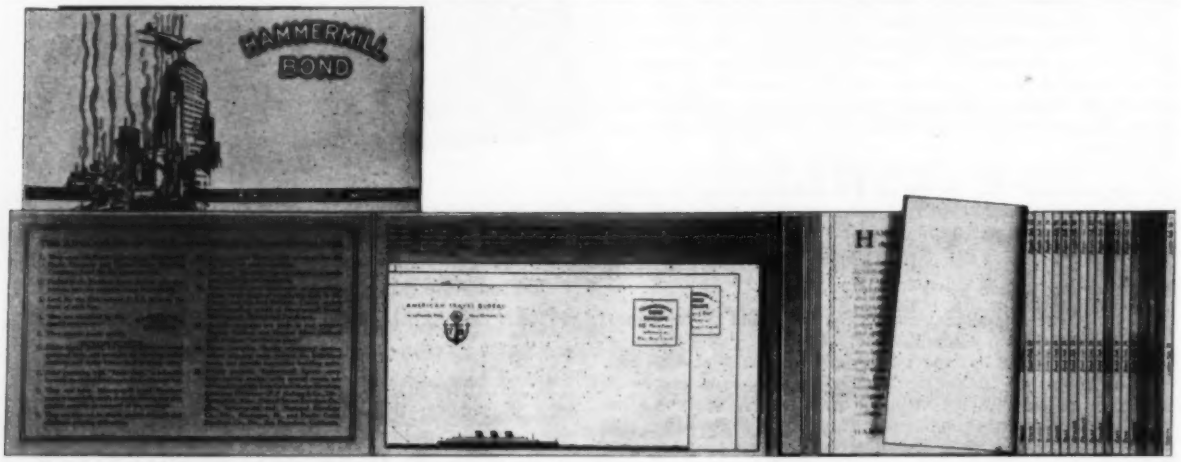

HAMMERMILL BOND "With Envelopes to Match!"

Mills that do not make bond paper are finding still another and added convenience in the new Hammermill Bond 5½ x 8½ sample book. This new sample book includes a section listing the stock sizes, weights, finishes and colors of Hammermill Bond Envelopes to match standard Hammermill Bond.

Stocked and distributed by 130 paper merchants in 99 cities, Hammermill Bond—"With envelopes to match"—assuredly is the world's "most convenient standard quality-utility paper."

Add this NEW sample to your files—if you don't make bond paper.

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As we do not manufacture bond paper, we would like a copy of the new 5½ x 8½ sample book showing range of stock sizes, dimensions, colors and finishes of Hammermill Bond Envelopes, as well as the full line of Hammermill Bond.

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taneous in action. In this laboratory is also a most remarkable recording device that shows the amount of pressure generated at every instant during a split second duration of every explosion.

Paper and Protective Coating Laboratories

One laboratory that will be interesting to all is the Paper Service Laboratory which is completely equipped for making test sheets and service tests of all kinds.

Another interesting demonstration will be that of the Protective Coating Laboratory which is fully equipped to answer the question "How good is it?" This is equipped with a flexible tester and in fact every test to determine the value of protection coatings, including accelerating weathering devices in addition to the open air exposure panel. Every device here is used with the objective of developing a better product.

A laboratory demonstration that will claim interest is a synthetic rosin development. The job of this laboratory is to obtain rosins which will be more stable to light, but will not discolor and which will not crystallize. This problem is attacked from every angle.

The Tornesite (chlorinated rubber) Laboratory also will claim its full share of interest. Researching is constantly carried on to the wider use of this product and it is certain that many paper men will be very much interested in this.

In order that everyone may see everything and get as much information as possible on whatever item interests him, Mr. Pickett will arrange to divide the visitors into small groups, of not more than 10 or 12 to the group. Each group will be in charge of the technicians of the laboratory, and each of these men will be fully informed of everything to be seen on the tour, so that no one may leave without getting the maximum amount of information.

The general laboratory as well as the semi-production laboratories are all equipped with everything required in the way of testing and measuring equipment of all kinds. In some cases, unusually expensive devices are employed and in others single purpose devices developed for that particular need.

This visit should be of intense interest to all, due to the wide field covered by the research.

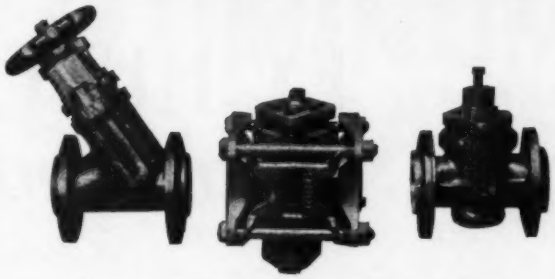
It is to be hoped that those who contemplate accepting this kind invitation of the Paper Makers Chemical Corporation will send a line to C. M. Connor, Glassine Paper Company, West Conshohocken, Pa., so that in turn he can advise our hosts what Pullman car accommodations they should provide and give them an idea of how many luncheons to prepare. It is suggested when writing Mr. Connor letting him know whether you will take in this Wilmington trip, how many there will be in your party, that at the same time you write the Hotel Ambassador, Atlantic City, and make your reservations for rooms. Time is going rapidly and if reservations are not made soon, there is a likelihood of being involved in a last minute rush and there not being the excellent choice that is available to those who make their reservations now. Prices are very reasonable and are special for the T.A.P.P.I. Convention: Single $3 to $6 and double $5 to $8. Please make your reservation today. When making reservations be sure to mention that this is for the T.A.P.P.I. Convention in order to secure the special rates.

Invitation to Du Pont and Krebs Plants

E. I. Du Pont de Nemours & Co., Inc., Wilmington, Dela., has extended an invitation to delegates to visit the Haskell Laboratory of Industrial Toxicology where Dr. Von Oettingen and his staff will be glad to show them such interesting apparatus and methods as will give them a new appreciation of the importance of scientific research and control in chemical manufacturing operations. The invitation also covers a visit to the Lithopone plant and research laboratory of the associated company, Krebs Pigment and Color Corp., Newport, Dela., where visitors will be entertained for luncheon.

Delegates will also have the opportunity to visit the plants of Pusey and Jones, Curtis Publishing Company and Cuneo Press, Inc.

C. M. Connor, Glassine Paper Company, Conshohocken, Pa., is in charge of these trips.



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What do you expect of them?

Isn't this what you want? Easy operating . . . exceptionally high resistance to the acids . . . freedom from contamination of the liquids handled . . . long lasting . . . mighty little maintenance and, finally, valves that do what they're supposed to do, and go right on doing it for year after year, without bothering you.

Well, that's what you can tell anyone about the valves shown above, for handling any of the solutions used in a paper mill.

The Duriron Y valve is ready to ship in eight sizes from ¾″ to 8″. The "P.R." valve is stocked in five sizes from 1″ to 4″ and the Duriron-Nordstrom valves in seven sizes from 1″ to 6″. Of course special valves will be made to your order.

You can put your trust in Duriron Company valves . . . they will give you the service that satisfies. Bulletin No. 161 will give more detailed information . . . write for it.

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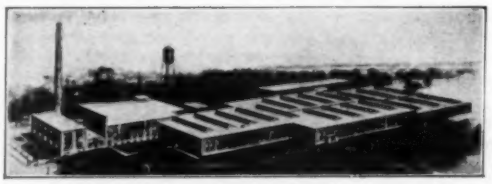

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TAPPI FALL MEETING ◆ PHILADELPHIA and ATLANTIC CITY ◆ SEPTEMBER 18, 19, 20, 21, 1935

CAMACHINES

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◆ Activities of the Import Committee of the American Paper Industry

An important case involving the dutiability of newsprint paper has been decided by the United States Customs Court. The paper in question was imported from Japan at San Francisco, and used for the Shopping News of that city. It was classified for duty as printing paper, on the ground that it contained 30 per cent of bleached sulphite. The importer protested that it was standard newsprint duty free. The Customs Court upheld the Customs officials in classifying the paper for duty. The case arose in 1932, when the Japanese paper was delivered in San Francisco at $27 per ton. An effort to prove dumping was dropped because of the difficulty of learning Japanese production costs. The Customs officials then decided the paper was not standard newsprint, and this ruling has been upheld by the courts. The Import Committee of the American Paper Industry co-operated with both the Customs officials when the case was initiated, and later with the Department of Justice when the case came before the Customs Courts.

The Arkell Safety Bag company has again taken to the United States Customs Court of Customs and Patents Appeals the question of the dutiable value of Swedish M. G. Kraft wrapping paper. This action is another step in the complaint made by the Import Committee in 1931 against the undervaluation of this paper. The United States Customs Court decided the paper was properly valued by the importers, but an appeal to the United States Court of Customs and Patents Appeals held the paper was heavily undervalued, and referred the case back to the lower court to find a proper value. The lower court then found a dutiable value higher than that originally fixed by the appraiser, and the importers now have appealed again on the ground that the lower court has no power to find a higher value than that fixed by the Customs officials. Since the case was initiated the importers have been forced to pay duty on the higher valuation, and will continue to pay this higher duty until a final decision is rendered.

◆ THE DEVELOPMENT OF PAPER yarns and fabrics in Germany, which received considerable impetus during the period 1914 to 1919, did not cease with the war. Great progress has been made during the post-war years and elaborate methods have been devised for producing even finer, softer, and stronger yarns. The latest German process departs from ready-made paper entirely and produces yarn direct from the pulp. This new product is known as "Zellulongarn". The machine for the manufacture of "Zellulongarn" retains only the wet end of the ordinary paper machine up to and including the wire. The dry end is replaced by machinery which is essentially textile. The pulp for paper yarn is unsized and therefore soft and pliable. Bleaching and dyeing is carried out in the beater. Despite the complete absence of size, the product is very strong. It may be impregnated with paraffin or some other suitable material, which is reported to facilitate the further handling of the yarn. It may also be polished by running it through a polishing funnel. (W. S. Jesien, American Consulate General, Frankfort-on-Main.)

◆ New Safety Contest

THE PAPER INDUSTRY safety contest among the paper mills of the pulp and paper section of the National Safety Council has started off with an unusually large number of entrants. The scores for the first month, which appear in this issue, show 64 mills reporting a perfect safety month.

These contests run continuously for one year from July 1 to June 30, and the winners are announced at the annual Congress in the fall. The Congress this year convenes October 14 to 18 at Louisville, Ky., at which time trophies will be awarded to winners in the contest which closed June 30th.

The present contest is operating under the same rules as last year with one exception. At the Executive Committee Meeting held last January it was moved and agreed that the rules be revised as follows: "All operations outside the mill yard proper, such as logging, lumbering, reforestation, marine and railroad transportation shall be excluded."

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CABLE ADDRESS: Lycurgus, N. Y.
In Canada: The Nichols Chemical Co., Ltd., Montreal, Toronto

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THE CLEVELAND CRANE & ENGINEERING CO.
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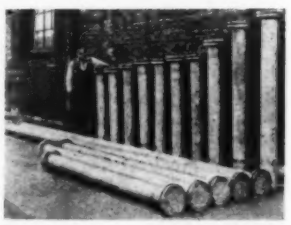
A SERIES of Six Folders is being published picturing numerous applications of Cleveland Tramrail—also giving facts and engineering reasons why over 3500 customers have purchased 15000 Installations of Cleveland Tramrail.

● The first two of these folders have been mailed to 25000 prospective users of Cleveland Tramrail. If YOUR name is not on our list, notify our district representative in your territory or our Home Office—we will add it, and send you back copies of the folders.

MISCO
Heat and Corrosion Resistant Alloys

Cream of CASTINGS by Centrifugal Force

As demonstrated in an ordinary milk bottle, the cream is at the top. In any fluid, lighter particles in a state of suspension rise to the top. Heavier constituents sink downwards under the action of gravity. Molten metals contain minute inclusions of lighter impurities that rise toward the surface of fluid metal in a stationary mold. They are usually entrapped beneath the layer of metal that solidifies first. Their presence is often unsuspected until revealed by machining operations, and experience dictates liberal finish allowances to cut away defective areas. Centrifugal force will separate constituents of different densities. Applied to castings, its action is to separate heavy alloyed constituents from the lighter inclusions comprising slag, sand, oxides or gaseous matter, which are impelled to the inner surface where their presence is of no practical significance and their removal easily accomplished. MISCO "Centricast" Products are formed centrifugally. The metal is dense, uniform and sound throughout. They are free from shrinks, voids, and subsurface imperfections of any kind. Very little machining allowance is necessary, very often, none.



Part of a shipment of MISCO "C" "Centricast" pipe to a midwest sulphite plant.

Your inquiries are invited.

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The Paper Industry Safety Contest

July 1, 1935 to June 30, 1936

July Scores. 64 Report "Perfect"

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A	Anglo-Newfoundland Development Co., Ltd.	Grand Falls	Newfoundland
	Hollingsworth & Whitney Co.	Algonquin & Taconnet	Waterville, Me.
	Ohio Boxboard Co.	Rittman	Ohio
	Dill & Collins Co.	Philadelphia	Pennsylvania
	Bird & Son, Inc.	East Walpole	Massachusetts
	Bryant Paper Co.	Kalamazoo	Michigan
	Eddy Paper Corp.	Three Rivers	Michigan
	Container Corp. of America	Philadelphia	Pennsylvania
	Waldorf Paper Products Co.	St. Paul	Minnesota
GROUP B	International Paper Co.	Niagara Falls	New York
	Restigouche Co., Ltd.	Campbellton	New Brunswick, Can.
	Nekoosa Edwards Paper Co.	Nekoosa	Port Edwards, Wis.
	Kimberly-Clark Corp.	Badger-Globe	Neenah, Wis.
	Fraser Paper Ltd.	Madawaska	Maine
	Consolidated Paper Corp., Ltd.	Port Alfred	Montreal, Que., Can.
	St. Croix Paper Co.	Woodland	Maine
	Kimberly-Clark Corp.	Niagara	Wisconsin
	Cornell Wood Products Co.	Cornell	Wisconsin
	Fibreboard Products, Inc.	Vernon	California
	Container Corp. of America	Cincinnati	Ohio
GROUP C	Marinette & Menominee Paper Co.	Marinette	Wisconsin
	Finch Pruyn & Co., Inc.	Glens Falls	New York
	P. H. Glatfelter Co.	Spring Grove	Pennsylvania
	International Paper Co.	Little Island	No. Tonawanda, N. Y.
	Crystal Tissue Co.	Middletown	Ohio
	Escanaba Paper Co.	Escanaba	Michigan
	Continental Paper & Bag Corp.	York Haven	Pennsylvania
	Hoberg Paper & Fibre Co.	Fibre Div.	Green Bay, Wis.
	Harriman Co.	Harriman	Tennessee
	Ontonagon Fibre Co.	Ontonagon	Michigan
	Consolidated Water Power & Paper Co.	Appleton	Wisconsin
	Bergstrom Paper Co.	Neenah	Wisconsin
	Consolidated Water Power & Paper Co.	Biron	Wisconsin
	Kimberly-Clark Corp.	Lakeview	Neenah, Wis.
GROUP D	Port Huron Sulphite & Paper Co.	Paper	Port Huron, Mich.
	Union Bag & Paper Corp.	Fenimore	Hudson Falls, N. Y.
	International Paper Co.	Webster	Orono, Me.
	Union Bag & Paper Corp.	Allen	Hudson Falls, N. Y.
	Container Corp. of America	Wabash	Indiana
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	Union Bag & Paper Corp.	Kaukauna	Wisconsin
	Hollingsworth & Whitney Co.	Aroostock & Cobbossee	Gardiner, Me.
	Upson Co.	Lockport	New York
	U. S. Gypsum Co.	No. Kansas City	Missouri
	International Paper Co.	Livermore	Chisholm, Me.
	Spaulding Fibre Co., Inc.	New Mill Plant	Milton, N. H.
	U. S. Gypsum Co.	Gypsum	Ohio
	Hollingsworth & Whitney Co.	Abenaquis	Madison, Me.
	Spaulding Fibre Co., Inc.	Hayes	No. Rochester, N. Y.
	International Paper Co.	Riley	Maine
	Mead Paperboard Co.	Rockport	Indiana

Division II—Remanufacturing

	Union Bag & Paper Corp.	Chicago	Illinois
	Union Bag & Paper Corp.	Specialty	Hudson Falls, N. Y.
	Bird & Son, Inc.	Norwood	Massachusetts
	Barber Asphalt Co.	Venice	Madison, Ill.
	New Orleans Corrugated Box Co., Inc.	Bogalusa	Louisiana
	Union Bag & Paper Corp.	Grocers	Hudson Falls, N. Y.
	Pollock Paper & Bag Co.	Dallas	Texas
	Bird & Son, Inc.	Chicago	Illinois
	Kimberly-Clark Corp.	Atlas	Appleton, Wis.
	Container Corp. of America	Natick	Massachusetts
	Container Corp. of America	Anderson	Indiana
	Texas Corrugated Box Co.	Dallas	Texas
	U. S. Gypsum Co.	Genoa	Ohio

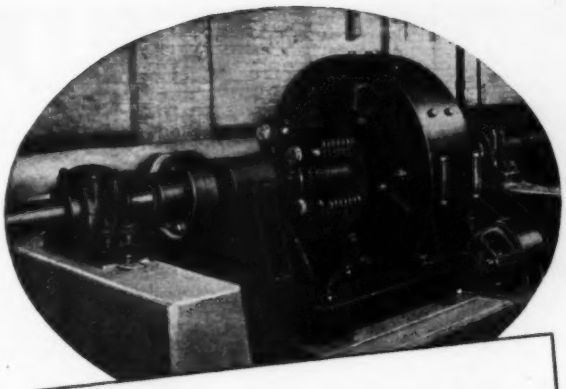
IMPERFECT SCORES

	Key Number	Rank	Disabling Injuries	Frequency Rate
GROUP A	P- 31	10	1	8.097
	P- 12	11	1	8.504
	P- 18	12	2	9.739
	P- 62	13	2	12.644
	P- 67	14	3	15.482
	P- 10	15	2	15.958
	P- 1	16	4	16.170
	P-102	17	3	16.471
	P- 13	18	3	21.072
	P- 69	19	3	22.624
	P- 74	20	4	26.924
	P- 87	21	4	30.675
	P- 73	22	5	32.876
GROUP B	P- 3	12	1	10.200
	P- 21	13	1	11.062
	P- 60	14	1	13.273
	P- 45	15	1	15.636
	P- 64	16	2	20.899
	P- 25	17	2	21.041
	P- 77	18	2	29.859
	P- 40	19	3	30.040
	P- 4	20	2	30.725
	P- 76	21	3	38.995
	P- 16	22	3	40.030
	P- 71	23	5	52.448
	P- 32	24	5	53.443
GROUP C	P-104	15	1	18.529
	P-112	16	1	21.007
	P- 33	17	1	23.102
	P-111	18	1	25.512
	P- 7	19	1	26.627
	P- 6	20	2	46.518
	P- 75	21	2	52.789
	P- 14	22	2	57.670
	P- 49	23	2	57.785
	P- 29	24	3	66.967
	P- 50	25	3	90.017
	P- 48	26	4	110.567
GROUP D	P- 98	18	1	35.958
	P-106	19	1	36.478
	P-107	20	1	45.337
	P- 42	21	1	63.532
	P- 80	22	2	68.229
	P- 99	23	1	68.611
	P- 53	24	1	83.410
	P- 24	25	2	89.622
	P- 90	26	1	104.932
	P- 8	27	2	137.174

Division II

R- 5	14	2	22.326
R-10	15	1	25.790
R- 6	16	4	34.707
R-14	17	1	67.843

No July Report: P-34, 35, 36, 37, 115, 114, 28, 83, 89, 88, 79, 113. R-7, 16.



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POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ At the Threshold of a New School Year

Within the next few weeks, thousands of young men will enroll in the technical schools of the country. In potential influence, this army of young men represents a power for scientific advancement which cannot be measured. Who will say but from their ranks may spring one whose contributions to the advancement of mankind will more than offset the cost of educating the entire group. Many, it is true, will fall by the wayside; some will enter other lines of endeavor; but considered in its entirety, the group will work its way to the ultimate goal.

It is not alone from the standpoint of learning the fundamentals of a particular profession that technical education is important. It is the development of logical, analytical thinking, which is the ideal of the engineering school.

Students, and frequently instructors, are prone to place too much importance on shop work, on drafting and other of the mechanical details. It is not the purpose of the technical school to turn out finished tradesmen; that can be accomplished more rapidly, and with less expense, on the job.

While the development of logical thinking as applied to engineering problems is important, that in itself is not sufficient. Unless the scheme of education trains the student to apply the same method of thought to general business problems, including his own advancement, the school itself is at fault.

An engineer who cannot write a business letter, who is not versed in economics, who does not understand the problems of labor, who, in short, has missed getting the modern executive viewpoint, has not fitted himself for making the most of his engineering training.

◆ Use of Draft Gauges

To secure the best possible furnace performance, i. e., the maximum obtainable efficiency at the desired capacity, requires that the draft in the ash pit, over the fire, and in the uptake, be controlled with considerable nicety. If this control is effected manually, it is essential that the fireman be kept informed at all times as to the draft conditions obtaining in his furnace. Should any change occur, he should know of it immediately and not have to wait until his pressure gauge or safety valve tells him what is taking place. This information can best be brought to his attention by the use of draft gauges.

For comparing the drafts at different points in the setting, two or more gauges are used, frequently mounted together on a single frame. The instrument may be so arranged that one gauge indicates the furnace draft and one the uptake draft or the differential between the grate and uptake.

By running a series of tests on the boiler and furnace at various loads, changing the position of the damper, ash pit doors and over fire openings, if necessary, and the thickness of the fuel bed at each load, a series of draft and CO_2 readings may be obtained. There will thus be found a certain combination of drafts that will give the highest CO_2 without forming CO for every load. It also will be found that the relation of drafts will be about constant for all loads so that an index may be put on each scale to mark the points for best draft conditions at rated load. At other loads, the liquid level in each tube should be equal distances above or below the indices for best results. Any variation from this relation will tell the fireman that all is not well in his furnace and further it will give him a pretty good idea as to where the trouble is.

As an example of what the gauge will indicate: Both levels at the pointers show best efficiency at normal load. If both levels are raised by an equal amount an overload at best efficiency is indicated or if both are lowered an equal amount of underload at best efficiency is shown.

When the damper draft decreases and the over-fire draft increases it is an indication of leaks in the baffling or clinkers or too thick a fire. In a hand-fired setting, this is the condition just after firing. After firing, the furnace draft will decrease and the damper draft will increase until an unbalance in the reverse direction occurs just before the next firing period. If this latter unbalance persists, it indicates holes in the fire or a thin fire or excessive slag and soot on the tubes.

◆ Keep Up the Safety Work

There is a tendency among many plant executives to regard safety work as something which can be handled by sporadically calling the attention of the men to its value in reducing accidents. It is not looked upon as a regular phase of operation such as maintaining high boiler room efficiency, cutting maintenance costs or any of the other problems which must be solved.

It is quite probable that this attitude has been the direct cause of lack of results in safety work. The safety idea must be sold from the top down. If the heads of the department do not look upon safety as a part of their regular duties, then the men down the line can hardly be expected to consider such work of any real importance.

Safety methods should be looked upon as an operating problem and unceasing attention should be given to this phase of power plant work.

◆ Recovery of Combustible Matter From Refuse

One of the factors of outstanding importance in modern power plant operation is the attainment of high fuel economy, that is, the securing of the most effective release of the total amount of energy in the fuel. Much has been accomplished in this direction, and the efficiencies obtained today are considerably higher than they were ten years ago.

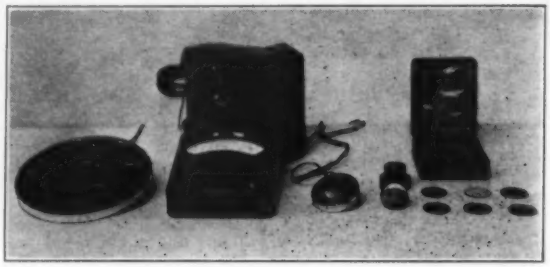
This advance in the more effective use of fuel, however, has been brought about mostly by advances in furnace design and combustion control. Little has been done in the recovery of combustible material from the ash and clinker.

There are a number of different systems in use for effecting this removal and the subject is one which may well be given thorough consideration, from the standpoint of fuel conservation.

◆ Ash Handling

One feature of plant operation which is yet in the primitive stage in many plants, is the method of handling and the disposal of ashes. Possibly the comparative lack of interest in this subject may be traced to the operating man's viewpoint that ashes are at best a necessary evil and that the method of handling and disposition are not of sufficient economic importance to warrant a study from purely efficiency standards.

In the past few years, however, increasing costs of labor, trucking, rail and boat transportation have necessitated a somewhat changed attitude toward this factor in plant operating costs. Operators have discovered, on analysis, that the cost of ashes were out of all proportion to other plant expense. As a result there has been considerable activity in the study of efficient handling methods and rapid strides have been made in the design and development of apparatus for such work.



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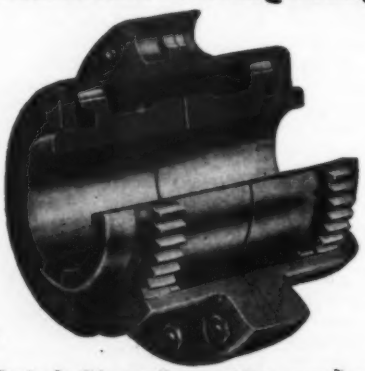

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TECHNICAL DEVELOPMENTS

IN THE PAPER INDUSTRY

The following abstracts are of the latest developments found in the foreign press. Photostats and translations of complete articles can be obtained at cost price.

◆ Structural Fiber Changes in Sulphite and Sulphate Cooks

A very suggestive article from the Institut für Cellulosetechnik u. Holzchemie at Stockholm. To the surprise of the anthor, it was shown that experimental sulphite cooks, carried out in a 10 liter rotary acid-proof steel digester, and subject to indirect electrical heating, gave pulps, the strength figures on

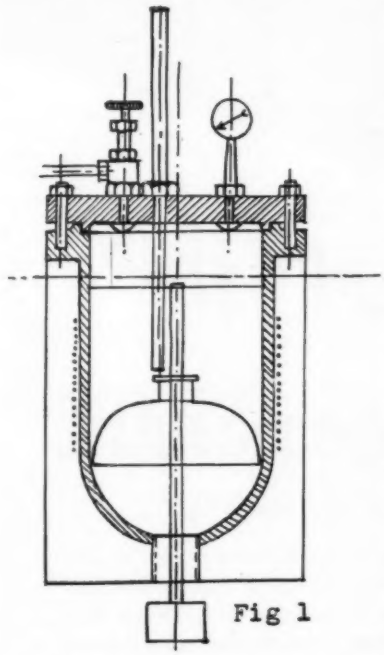

Fig 1

which varied widely, even when delignification was apparently carried out under strictly standardized conditions, and although overcooking (in the usual sense) was never observed. Two glaringly contrasting results are the following (where in each case a liquor of 1.4 grams CaO and 5 grams SO_2 per 100 cc. was used and where the liquor ratio was nearly 5):- (a) gave a Roe number of 4.8; 86 per cent alpha-cellulose; breaking length of 10,700 meters; Mullen test 6.9 kg./cm²; 5,800 double folds; and tearing strength in grams/ 16 strips of 69. On the other hand (b) gave a Roe number of 4.5; 84.5 per cent alpha cellulose; breaking length of 2,000 meters; Mullen test of 0.6 kg./cm²; no double folds; and a tearing strength of 26 grams/ 16 strips. While the superficial chemical properties remained but slightly changed, the differences in pulp strength are noteworthy. On defibrination, many of the fibers in (b) were easily broken. They filtered slowly, and showed other properties, divergent from those of normal pulp. The only difference of note, between the cooks (a) and (b), was that the digester had been more completely filled in the case of (a) than in that of (b). When a different acid-proof steel or when a glass stationary digester was used, the cooks always yielded high grade pulps, provided the digesters were well-filled with cooking liquor and chips. Evidently the material used in digester construction is not of primary importance in the results here obtained, while the extent to which a digester is filled is of major significance. This was also experimentally illustrated by carrying out a cook in a stationary steel digester divided into two sections by the introduction of the upper portion of a glass bottle as shown in Figure 1. The lower part of the digester (i. e. that portion within the confines of the glass and the base of the digester) was filled completely with chips and liquor. The portion above the bottle was filled only to two-thirds capacity. The cook was then carried out as usual, and the pulp from the upper digestion chamber was found to be much weaker than that from the lower part, as shown by the breaking length, stretch, pop-test, folding endurance, and mean fiber-length. There was more movement of the chips in the upper than in the lower compartment. These, together with numerous other digestion experiments, indicate that when defibrination results during the process of the cook, pulp strength diminishes, and that if the stuff is kept in motion to any marked degree, the resulting product becomes so weak that it is practically valueless. Technical sulphite pulps after defibrination, when rotated at 125 deg. C. with distilled water for 7-8 hours showed appreciable loss in strength, but when treated (with or without rotation) with acid cooking liquor diluted wtih water containing a small amount of waste liquor, for about 4 hours, the same pulps were rendered valueless. Superficially, under the microscope, the fiber looks uninjured, but it is so brittle that it readily falls to pieces. This phenomenon is not coupled with what is usually termed overcooking. The pulp is white, and the chemical properties (such as alpha-cellulose content, solubility in 1 per cent NaOH, copper number, and absence of carboxyl groups) are little different from those of the original untreated material. However, the viscosities of the defibrinated, chemically re-treated pulps are much lower than those of the original, although there is not always a direct relationship between the viscosity and the strength of the sheet. A photomicrographic study of the pulp when treated with cuprammonium solution (Schweizer's reagent) showed that while the original strong, technical pulp gave the usual blister-like swellings and bandlike constrictions as indicated in Figure 2, the weak, defibrinated pulp failed to show this behavior as revealed in Figure 3. The author therefore advances the working hypothesis that the membranes which surface the cellulose micelles, fibrils, and finally the fiber itself, are acted upon by the cooking liquor. As long as the fibers are held together in the form of the original chip, this attack is very slow, and the cutaneous substances are but slightly attacked. As soon as the fibers become separated this acid attack is noticeably increased. The viscosities of the pulp solutions appear to be independent of the outer membranes but are influenced by those which surround the micelles. Hence the viscosities do not always parallel the strength tests. Similar results were obtained in the case of sulphate cooks; a well-filled digester invariably giving stronger pulps than a half-filled digester. The author also reports in detail the differences in properties of the various, carefully separated fractions of his sulphite and sulphate cooks. He draws attention to the great risk involved in technical pulp production to this defibrination in the digester, which is far less in stationary than in rotary digesters. Naturally conditions are magnified in small-scale laboratory experiments, but at least they offer an

Prove this!

WHAT HAPPENS
When a V-Belt
BENDS

Fig. 1. *Straight-Sided Belt*

Fig. 2. *Belt with Patented* CONCAVE *Side*

ANY
V-Belt changes SHAPE
as it Bends around its pulley

When a V-belt bends, its top is under *tension* whereas its bottom is under *compression*. Naturally, the top grows *narrower*, the bottom *wider*. Figure 1 (on the left) shows this shape-change in a straight-sided belt. Note the outbulge of the sides. Now, in figure 2, note how the concave side *corrects* this distortion — producing a shape that *precisely fits* the sheave groove.

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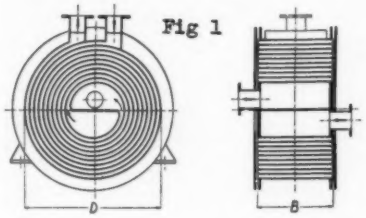
GATES VULCO ROPE DRIVES

explanation as to why sulphate pulps with low Roe numbers but with suitable tearing strength cannot readily be produced in rotary digestions. The original article includes 13 tables, 13 photomicrographs and 3 other illustrations. Erik Hägglund, Cellulose Chemic 16, Nos. 5/6, 41-49 (1935).

◆ Spiral Heat Exchanger

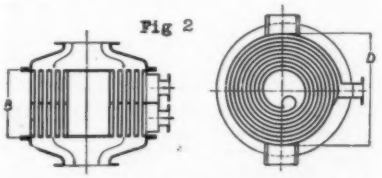
This article emphasizes the principle, construction, operation and use in pulp mills of the latest forms of spiral heat exchangers. As shown in Figure 1, two separate lengths of sheet metal are

Fig 1



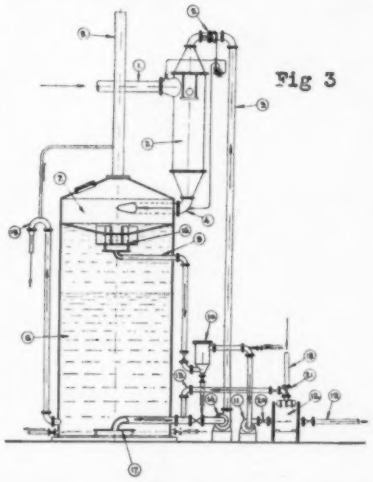
wound spirally around a central piece. A definite distance is always maintained between these spirals, thus forming the channels through which flow the two liquids in which the heat exchange is to take place. A middle partition divides the central cylindrical area into two chambers, which receive the discharge from the channels. The outer ends of the spirals are connected with two distributor chests extending over the entire width of the apparatus. The liquid that loses its heat and the one which is heated traverse a similar cross sectional area at every part of the spiral. The packing, weldings, outer (flat or spiral) covers, and the methods of cleaning the equipment are briefly discussed as are the advantage of the spiral exchange forms over the more usual types used in the pulp mills. In general, the cool liquid enters through an inlet at the circumference into one of the distributors, and, when heated, this liquid leaves through an outlet at the center of the apparatus. The counter-current principle is generally used; the hot liquid (or gas) entering the apparatus at another central opening on the side opposite to that discharging the liquid and leaving at the top. This is also indicated in Figure 1. Modifications required for the condensation of exhaust steam in sulphate mills or for cooling

Fig 2



relief gases are shown schematically in Figure 2. The cooling medium flows in the direction described above, but the gas or vapor is led into the apparatus vertically in transversal flow. The equipment is made of acid-proof steel. Two of the several actual examples found in mill practice follow: (A) Using two batteries, each consisting of 8 preheaters with a heating surface of 75 sq. meters per preheater, 5,000 liters of clean water were raised from 10 deg. to 40 deg. C. per minute by the use of 6,000 liters of waste water, the initial temperature of which was 45 deg. This involves a saving of 9 million heat units per hour. The floor-space per battery of 8 is 21 square meters. (B) In a sulphite mill, a spiral preheater having a heat exchange area of 14 sq. meters is used to cool a relief mixture of 1,500 kilos of SO_2 and (an unstated amount of steam), the heat content of which is 925,000 kilogram-calories at 100 deg. C. This mixture is cooled to 35 deg. thereby raising 18.5 cubic meters of water from 20 to 70 deg. C. per hour. This relief cooler is ample for handling the gas and steam from three sulphite digesters each of which has a capacity of 120 cubic meters. To condense steam, when sulphate digesters are blown, the Rosenblad system shown in Figure 3 is used in heating water for diffusers etc. It has been widely adopted in Sweden and Finland. The older types led to frequent scale formation, and, despite construction with acid-proof metal, to corrosion. In the Rosenblad

Fig 3

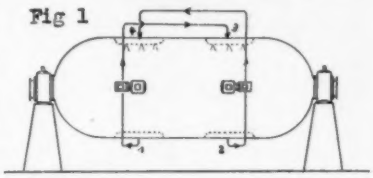


system, the waste steam enters the jet condenser (2) through line (1) and is condensed by the condensate (temperature 40 deg. C.) flowing through (3) at such a rate [regulated by valve (5)] that the temperature of the mixture at the outlet (4) of (2) is about 90 deg. C. This hot condensate accumulates in the container (6), which has a capacity ample to handle the required water volumes at the periods of maximum load. At the central point of the operation is the spiral preheater (12) for the preparation of warm water, with inlet (18) and outlet (19) which uses the 90 deg. condensate, in a continuous operation through inlet lines (9) and (10) and pump (11), and outlet line (13). Thus the hot condensate is cooled from 90 deg. to 40 deg., and at this temperature the so-called cold condensate is fed partly into (6), partly through pump (14) and line (3) into (2), to serve as condensing medium. If warm waste water from the mill can be used as a condensing means in (2) the so-called cold condensate is not required for this purpose. Iron sheet metal serves in the spiral heat exchanger. The application of spiral preheaters in the sulphite industry, with special reference to the recovery of heat and of SO_2 is also discussed in some detail. All of the equipment described is covered by patents. Dr. -Ing.v.Lassberg. Munich. Papier-Fabr. 33, No. 24 (T.S.) 201-6 (1935).

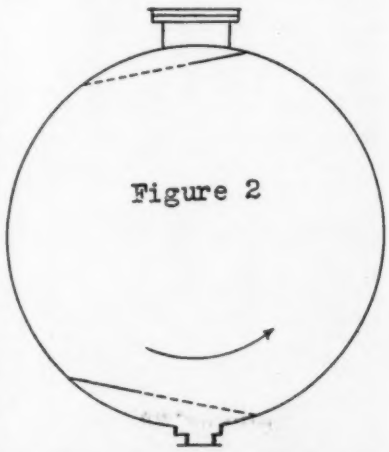
◆ Horizontal Rotary Digesters With Forced Circulation

This is largely a description of Swedish patents Nos. 81,615 and 81,616 which have sought to overcome those

Fig 1



difficulties in design that have made horizontal rotary sulphate digesters relatively unpopular in European practice. The digester used in the first patent is diagrammatically illustrated in Figure 1. The pumps which circulate the liquor, and the motors driving them are fastened directly to the digester shell, and rotate with it as the digester revolves. Rails passing around the digester, carry the electric current to the motors through a sliding contact. By placing the motors at various points on the digester surface, and by introducing the liquor under pressure at carefully chosen points [e. g. (3) and (4)] and by removing it by suction at the sites (1) and (2), the direction of the circulation within the digester may be regulated according to will. Screens within the digester also can be shifted from place to place. The author discusses the fashioning and the placement of these screens, one type of which is



indicated in Figure 2, showing the cross section of the digester and the obliquely placed screens (indicated by the broken lines). The materials in pumps, pipe-

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lines, and screens are all of the highest grade, acid-proof materials. W. Schmidt. Papier-Fabr. 33, No. 24 (T.S.) 206-7 (1935).

◆ Moisture Determination in Wood

This gives a survey of climatic conditions in Germany, including 2 maps showing mean temperatures in January and the relative humidities in July, and the effect of these conditions. The author classifies the various methods for moisture determination of wood, into five main categories: (a) the direct drying of small wood samples to constant weight; (b) extraction of samples with hydrocarbons (this would include distillation with xylol; (c) the use of hygroscopic substances which are an index of the state of equilibrium between the moisture content of the wood and that of the surrounding air and which function either by changes in volume or by color changes (and which are especially valuable for rapid determinations when the moisture content of the wood is relatively low, i. e., 5-12 per cent; (d) measurement of the electrical resistance of wood which is extremely rapid and which decreases according to a simple logarithmic function with increasing moisture content up to the fiber saturation point; and (e) measurement of the dielectric constant of wood, which seems especially promising since the dielectric constant of water is 81.6, while that of dry wood is about 2. The value of the dielectric constant method for moisture, which is also very rapid, has been enhanced by the invention of the Heilan instrument (made in Frankfort) which is briefly described. The dielectric constant curve of wood-water mixtures and the corresponding capacity of the measuring condenser, moisture content-capacity curves, a graph showing the dependence of dielectric constant on the thickness of the dielectric, etc., are included together with 23 recent references. Edgar Mörath, Darmstadt. Die Zellstoff Faser (Supplement of Wochbl. Papierfabr.), 32, No. 1, 2-7 (1935).

◆ Significance of the Lime Content in Sulphite Liquors

If the SO_2 content of a liquor is kept constant at 5 per cent and provided the maximum temperature of digestion is never over 125 deg. C, the cooking period required to obtain a 55 per cent yield of spruce pulp must be extended by approximately 1 hour for each 0.2 gram increase in CaO per 100 cc of cooking liquor. For a given yield, the sugar content of the liquor decreases linearly with increasing lime content. The yield of stock (with 3-4 per cent screenings) increases from 57 per cent to 58.5 per cent as the CaO content rises from 0.6 to 1.6 per cent. For screened stock, the pulp yields increase roughly by 0.2 per cent of the weight of the wood, for each 0.1 per cent rise in the CaO in the liquors. The effect of the lime in the case of varying degrees of delignification (where all the factors are kept constant) is indicated by the following data:—0.6 per cent CaO yielded 55 per cent, 1.0 per cent CaO gave 57.8 per cent and 1.4 per cent CaO yielded 58.6 per cent pulp all with Roe No. of 10. Similar increases were noted when pulps having Roe numbers of 5 and 3 were produced. As the lime content rises from 0.6 to 1.0 per cent the rate of increase in yield of pulp is more rapid than when the lime content rises between 1 per cent and 1.4 per cent. The experiments serve definitely to show the advantages of a high lime content in the sulphite liquors. Pulps thus obtained show an increase in tearing lengths and bursting strengths and tear resistance. This was especially marked when the degree of pulping is relatively low. Whiteness of the pulp also increases with rising lime content. E. Hägglund and H. Nihlén. Svensk Papers-Tidn. 37, 754 (1934) through Papier-Fabr. 33, No. 20, (Abstracts) 82-3 (1935).

◆ The Permanganate-Chlorine and Roe Numbers of Pulp

The so-called PClZ (i. e., the permanaganate-chlorine number previously described by the author) (Cf. Papier-Fabr. Festschrift 1931, 73) is reviewed in detail, and has been compared with a greatly simplified modification of the method for obtaining the Roe number of pulps. This modified procedure involves the use of 2 grams of dry pulp, disintegrated with 100 cc. of water, and subsequently treated with 50 cc. of 0.2 Normal chlorine water (a solution containing 0.355 g. free chlorine). An excess of potassium iodine is added at the end of 15 minutes, and the free iodine titrated with standard 0.2 Normal hypo solution. The equipment, which is exceedingly simple, is fully described and illustrated in the original article. The sketches include apparatus used in preparing the standard chlorine solution, withdrawing the chlorine water, the so-called bromine-flask used in the determination, and the apparatus used in the final titration. The author claims that the results check closely with the PClZ, and also that they are more accurate than those obtained by the use of Roe's original method. Using identical pulp samples these data were directly compared with those given by the Sieber-Humm, the Johnsen-Noll, and the Johannssen-Oestrand methods. The resulting values, until the degree of pulping reaches a Roe number of about 50 are in fairly close agreement. With higher percentages of lignin, however, the PCIZ (while still in agreement with each other) diverge from and are distinctly higher than the numbers found by the other methods. Albert Küng. Papier-Fabr. 33, No. 7, 60-63 (1935).

◆ Pulp Strength Testing in 1934

Another detailed report of the German Testing Commission, in which the hydration of pulp is carried out with a new grooved Jokro mill, in two different laboratories. Results of numerous strength tests are given. While the Swedish method of sheet formation (according to Dr. Johansson of Oestrand gives rise to a sheet stronger than that obtained in the Rapid Köthen sheet machine, the German commission finds that differences (in breaking length, at least) disappear when the Swedish sheet is dried in the Rapid Köthen drier. (Cf. THE PAPER INDUSTRY, May 1934, p. 129). The rapid Köthen sheet-forming technique is favored over the Jokro method for sheet formation, since the latter gives a decidedly weaker pulp under identical conditions of hydration, both hydrations having been made in the Jokro mill. This is indicated by data on breaking length, tear resistance, folding endurance, and weight per volume. These differences become less marked as the time of beating increases, but the Jokro sheet machine is generally less satisfactory. Results of the commission's work are given in 8 graphs and 9 tables and a strong plea is made for the international adoption of standardized strength tests. Ernst Unger. Papier-Fabr. 33, No. 18 (T.S.) 153-8; No. 19, 161-5 (1935).

◆ Wood-Gum and Pentosans in Pulp

This is the 9th memorandum of the Fiber Analysis Commission of the German Association of Pulp and Paper Chemists and Engineers. In the determination of wood-gum, 10 grams of air-dried pulp flakes, on which a separate moisture determination has been made [Cf THE PAPER INDUSTRY, 16, No. 9, 647 (Dec. 1934)] are treated with 200 cc. of 5 (vol) per cent NaOH at 20 deg. C. The mixture is kept at this temperature for exactly 2 hours, and then filtered on a Gooch crucible, so as to form a fiber mat without the use of filter paper. Twenty-five cc. of this filtrate are treated (in a 250 cc. measuring flask) with 20 cc. of 1.5 normal potassium bichromate solution, and subsequently with 35 cc. sulphuric acid (density 1.84). After agitating, the mixture is allowed to stand for 5 minutes. It is then cooled, and diluted to 250 cc. Of this, 50 cc. are pipetted out and treated with 10 cc. 5 per cent KI. The iodine thus freed is titrated with standard hypo, and the alkali-soluble material (i. e., wood gum) calculated on the basis of bone dry pulp. (One hundred cc. of 0.1 normal bichromate is equivalent to 0.0675 g. alkali-soluble matter). Exact methods for calculation are given. The method is essentially that of Bubeck [Papier-Fabr. 25,617 (1927)]. The Tollens number i. e., the pentosan determination is made according to the method of Kullgren and Tydén Ingeniörsvetenskaps Academiens Handlingar, 1929, 94, which is a modification of the older procedures, depending on the oxidation of furfural to the corresponding acid by the use of 3 mols $KBrO_4$, 5 mols KBr, and 6 mols HCl for each 3 mols of furfural. Detailed procedure and calculations are carefully described. The article contains 16 literature references. Anon. Papier-Fabr. 33, No. 27 (T. S.) 225-6 (1935).

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Inquiries with reference to any of these patents should be addressed to James Atkins, Munsey Building, Washington, D. C.

Compiled by James Atkins, Registered Patent Attorney

2,007,470—Paper Manufacture. Arthur R. Harvey, Middletown, Ohio, assignor to The Gardner-Richardson Company, Middletown, Ohio, a corporation of Ohio. Application April 27, 1932. Serial No. 607,744. 12 Claims. (Cl. 92—41). A sheet of paperboard comprising a body, a plurality of liner layers of fibrous material thereon, and a coating of mineral color and a binder interposed between two of said liner layers for the purpose of improving and whitening the appearance of the sheet. The method of making a paper product having great strength combined with a good appearance which comprises forming a fibrous body, applying a thin layer of fibrous material of better quality to the body, coating said layer with a water suspension of clay mixed with sufficient size to serve as a bonding material, and applying a further layer of fibrous material of good quality.

2,007,551—Method of and Apparatus for Making Paper Board. John D. Tompkins, Valatie, N. Y. Application January 31, 1933. Serial No. 654,428. 11 Claims. (Cl. 92—38). In a device for the manufacture of paper boards, the combination of a plurality of forming cylinders, a plurality of couch rolls and a lower felt cooperating with said cylinders, a suction roll for said lower felt, an upper felt adapted to cover a portion of the surface of a paper board mass on said lower felt, press rolls for applying pressure to said felts and a drying cylinder, said upper felt carrying a newly formed paper board from said lower felt to said drying cylinder.

2,008,142—Paper and Method of Making. James L. McClellan, Littleton, Mass., assignor to Hollingsworth & Vose Company, Boston, Mass., a corporation of Massachusetts. No Drawing. Application May 16, 1932. Serial No. 611,573. 12 Claims. (Cl. 92—13). Method of preparing paper pulp, containing cotton, hemp, kraft or sulfate fibers, comprising the steps of mixing the same with a caustic solution of mercerizing concentration at a temperature of approximately 180° F., agitating the mixture while causing the temperature of the same to drop gradually, and washing the fiber substantially free from soluble reagents and by-products.

2,008,318—Guide-Roll. John A. Ziegler, Camas, Wash. Application December 1, 1934. Serial No. 755,546. 12 Claims. (Cl. 74—241). In a paper-making machine, a guide-roll whose ends are journaled in rotatable wheels movable in the direction of the felt travel, said wheels riding on rails carried by the sides of the machine frame, said rails provided with abutments at their ends, and inclined downwardly in the direction opposite to that in which the felt travels, said wheels normally resting against the lower of said abutments, whereby the felt on creeping towards either side of the machine will contact one of said wheels and roll it ahead, thereby advancing the corresponding end of the guide-roll and effecting the correction of said creeping.

2,008,635—Process of and Apparatus for Producing Pulp. William Brubacher, Kapuskasing, Ontario, Canada. Application May 5, 1932. Serial No. 609,519. 18 Claims. (Cl. 92—7). A continuous process of cooking pulp which comprises introducing into a digester fibrous material to be converted into pulp, such fibrous material being introduced substantially free from pulp cooking chemicals, moving a body of said fibrous material in said digester toward a pulp cooking zone, elevating the temperature of said fibrous material in said digester during its movement toward said cooking zone, maintaining a pulp cooking temperature in said cooking zone, mixing with said body of fibrous material as it aproaches said cooking zone cooking liquor at an elevated temperature and in substantially unspent condition, passing the fibrous material in contact with said cooking liquor through said cooking zone, and moving the resulting cooked pulp away from said cooking zone and out of said digester.

2,008,892—Method of Manufacture of Pulp. Arne Johan Arthur Asplund, Stockholm, Sweden, assignor to Aktiebolaget Defibrator, Stockholm, Sweden, a corporation of Sweden. Application September 19, 1934, Serial No. 744,657. In Sweden March 29, 1932. 8 Claims. (Cl. 92—20). The process of defibrating ligno-cellulose material which includes heating the material within a temperature range between 212° F. and a point at which the ligneous substance of the middle lamella of the material is markedly softened and in an essentially gaseous environment chemically inert to said material, and mechanically defibrating said material while heated within said range and in said environment.

2,008,974—Method for Making Corrugated Board. David Weber, Philadelphia, Pa., assignor to David Weber and Company, Philadelphia, Pa., a corporation of Pennsylvania. Application December 2, 1933, Serial No. 700,735. 14 Claims. (Cl. 154—33). The method of making double-walled corrugated board consisting of applying paste to the exposed ridges of a continuously fed single-faced corrugated board, successively feeding preformed sheets of double-faced corrugated board into parallel contact with the last mentioned ridges so that the axes of the corrugations of the former extend at right-angles to the axes of the corrugations of the latter, pressing the double-faced boards and the single-faced run together, and heating and drying the same.

2,009,184—Paper Making. William P. McCorkindale, South Hadley Falls, Mass., assignor of one-half to The McCorkindale Company, Holyoke, Mass., a corporation of Massachusetts and one-half to American Writing Paper Company, Inc., Holyoke, Mass., a corporation of Delaware. Application April 4, 1934, Serial No. 718,971. 13 Claims. (Cl. 92—39). The process of making paper which consists in, forming successive sheets of paper on a foraminous surface, transferring said sheets to separate successive carriers by means of suction and in subjecting the carriers to heat for drying said sheets.

2,009,185—Water-Marking. William P. McCorkindale, South Hadley Falls, Mass., assignor of one-half to The McCorkindale Company, Holyoke, Mass., a corporation of Massachusetts, and one-half to American Writing Paper Company, Inc., Holyoke, Mass., a corporaiton of Delaware. Application April 4, 1934, Serial No. 718,972. 8 Claims. (Cl. 92—48). A process of producing watermarked paper which consists in depositing paper-making material on a non-rounded foraminous surface by suction, the said surface having a depression therein in the form of a water-mark being produced whereby the water-marked portion of the paper is of greater density than the main body thereof.

2,009,631—Apparatus for Coating Paper. William J. Montgomery, Hamilton, Ohio, assignor to The Champion Coated Paper Company, Hamilton, Ohio, a corporation of Ohio. Application May 28, 1932, Serial No. 614,265. 5 Claims. (Cl. 91—47). In a web coating machine the combination with an applicator roll and a doctor roll rotatable in the same angular direction, of a variable speed motor connected to drive the applicator roll, a differential gear interposed between said motor and said doctor roll,

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a second motor capable of delivering relatively constant speed, connected to and driving said differential gear to impart to said doctor roll a constant speed increment.

2,009,857—Machine for [illegible]nvelopes and the Like. Adolph Pot[illegible]vin, Garden City, N. Y., assignor to Pot[illegible]in Machine Company, New York, N. Y., a corporation of New York. Application September 30, 1932, Serial No. 635,494. 7 Claims. (Cl. 93—18). In a machine for making envelopes and the like from a web of material, the combination of means for continuously advancing the web, and notching devices at each side of the advancing web adjacent the edges thereof for notching the web at predetermined intervals, each of said notching devices continuously rotating about axes parallel to the direction of travel of the web and having their leading edges slightly lower than their trailing edges.

2,010,150—Paper Machine. James W. Hemphill, Yonkers, N. Y., assignor to Johns-Manville Corporation, New York, N. Y., a corporation of New York. Application April 5, 1934, Serial No. 719,087. 5 Claims. (Cl. 92—51). A paper machine comprising a moving member of the type of a Fourdrinier wire having wet paper stock thereover and a plate element disposed below a portion of the said member and in frictional contact therewith, the said element including a shaped and hardened composition containing toughening fibers and a binder composition therefor, the said sheet being of low coefficient of friction with the said wire.

2,010,308—Apparatus for Making Ply-Board. Arthur G. Leonard, Jr., Wilmington, Ill., assignor to Orenda Corporation, Chicago, Ill., a corporation of Illinois. Application August 13, 1934, Serial No. 739,515. In Canada April 19, 1934. 16 Claims. (Cl. 92—67). In a plyboard making machine, the combination of an accumulation roll, cutting means mounted to rotate with said roll, and adapted and positively driven to cut the web on said roll from one end to the other of said roll during each revolution of said roll.

2,010,567—Card Cutting Machine. Theodore A. Schwamb, Boston, Mass., and Sidney P. Smith, Norwichtown, Conn., assignors to John T. Robinson Company, Boston, Mass., a corporation of Massachusetts. Application May 31, 1933, Serial No. 673,692. 18 Claims. (Cl. 164—61). In a card cutting machine, in combination, a series of cutting instrumentalities for cutting stock into a series of cards and comprising two parallel shafts provided with coacting rotary cutters longitudinally adjustable thereon, a collecting unit including a plurality of conveyors, and a delivery unit including a plurality of sets of feed rolls to deliver cards to said conveyors respectively and deflectors for directing adjacent cards of the series to different sets of feed rolls as they leave the cutters, said deflectors being adjustable in said delivery unit in accordance with the adjustment of said cutters, said collecting unit being movable away from said delivery unit, and said delivery unit being movable away from said cutters to render said cutters and deflectors accessible for purposes of adjustment.

2,011,149—Decorated and Saturated Sheet and Process of Preparing the Same. Ralph G. Jackson, Woodbury, N. J. Application September 29, 1931, Serial No. 565,872. Renewed February 14, 1934. 11 Claims. (Cl. 91—67.9). A decorative sheet covering comprising a sheet of absorbent non-woven fibrous material of substantially even density and thickness throughout having decorative coloring matter in printed designs extending substantially through the thickness thereof and tinting the fibrous particles but not closing the voids between the particles, said sheet being saturated substantially throughout the thickness with a transparent saturant which is susceptible to being rendered fluid by heat without deterioration and is capable of solidifying upon cooling.

2,011,156—Process for the Manufacture of Paper. Harry Huet Nelson, Paris, and Guillaume Becker, Versailles, France. No Drawing. Application April 14, 1933, Serial No. 666,224. In France April 19, 1932. 2 Claims. (Cl. 91—68). Process of manufacture of a waterproof and highly resistant paper or cloth consisting in moistening the formed paper web with a dilute solution of thiosulfocarbonate, in then impregnating the web with a solution of freshly prepared cellulose thiosulfocarbonate, and in precipitating hydrocellulose constituting the binder of the cellulose fibers by means of a coagulant of viscose of weak acidity.

2,011,439—Apparatus for the Manufacture of Cementitious Sheets. René Dorn and Martin Willis, New Orleans, La. Application April 28, 1932, Serial No. 607,971. 14 Claims. (Cl. 25—42). Apparatus for forming a sheet from pulp comprising a rigid matrix having the contour and extent of the finished sheet, and means independent of said matrix for forming pulp into a layer and applying said layer upon said matrix.

2,011,440—Process for Making Cementitious Sheets. René Dorn and Martin Willis, New Orleans, La. Original application April 28, 1932, Serial No. 607,970. Divided and this application March 1, 1933, Serial No. 659,133. 16 Claims. (Cl. 154—33). In a process for making structural sheets from a cementitious pulp, the steps which comprise forming a mass of said pulp into a layer of the desired thickness and, directly as formed, depositing said layer upon successive portions of a matrix having substantially the surface contour of the finished sheet, and compacting said layer upon said matrix. In a process of making structural sheets from a pulp containing cementitious and fibrous materials, the steps which comprise forming a mass of said pulp into a layer of the desired thickness with at least a large part of the contained fibres oriented into planes more or less parallel with the surface of the layer, and directly as formed, depositing said layer upon successive portions of the surface of a matrix having substantially the surface contour of the finished sheet, and compacting said layer upon said matrix.

2,011,452—Manufacturing Paper Tubes and the Like. Alfred Lutz, Bredereiche-Uckermark, Germany. Application June 9, 1930, Serial No. 460,019. In Germany June 14, 1929. 5 Claims. (Cl. 93—94). The method of manufacturing paper and fiber tubes and the like, which comprises telescopically applying a tubular paper structure and a tubular coating structure of different degrees of temperature and moisture engagingly into each other, drying and reducing the temperatures of said structures, and shrinkingly engaging the same.

◆ ◆

◆ THE SAMPLING pipe through which passes the flue gas collected for analysis should be placed in the most active part of the gas flow. A good way to tell that you have the pipe in the right place in the uptake at the damper on the boiler side is to move it in and out across the gas path, analyzing samples collected at each position; the point where the quality of the gas varies most widely in a given time is the correct place for the sampling pipe.

◆ Twelfth Annual Exhibition of Printing for Commerce

The American Institute of Graphic Arts is organizing its 12th Annual Exhibition of Printing for Commerce to open in New York City, in November, 1935.

The Call for Specimens will be mailed *early in September* to printers, typographers, engravers, advertising agencies, paper houses, etc., in the United States and Canada. All organizations and individuals interested, are invited to send to the Institute office, examples of their best work produced since September 1934. The printed folder will give requirements.

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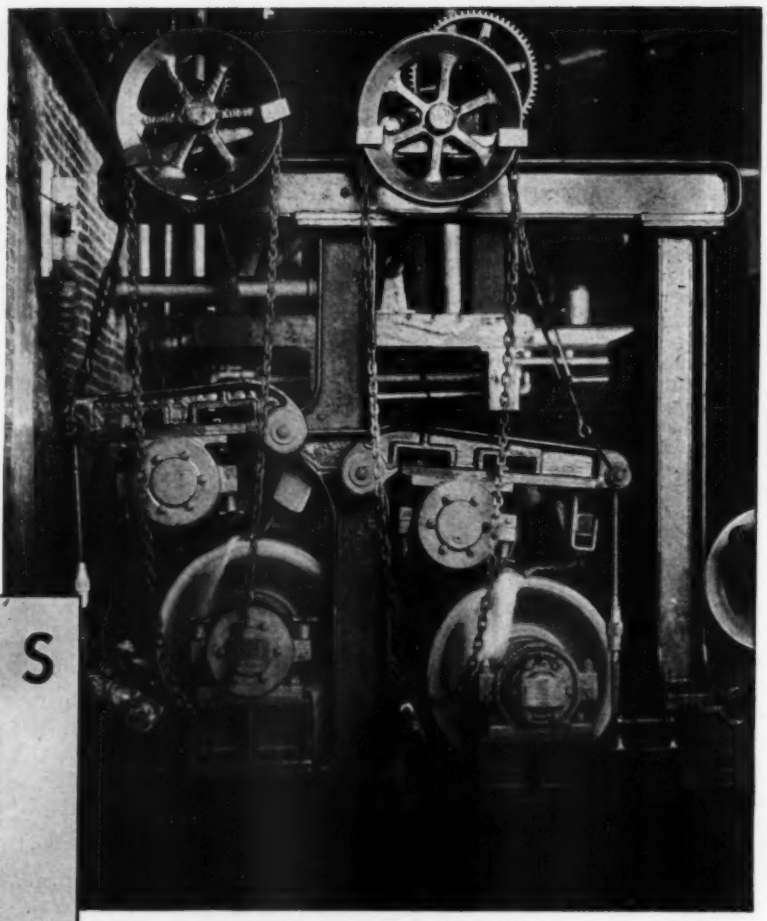

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The COMMERCIAL OUTLOOK

New York, September 3, 1935.

THERE are glowing prospects for a substantial increase in demand for paper and an appreciable expansion of paper manufacturing activity this fall. On all sides within the industry are heard expressions of confidence, if not enthusiasm, regarding the near future of the market, based on the general trade and industrial situation as developed recently and signs of further improvement.

There seems no question that a marked pick-up in general business has occurred during the last few weeks. Proof of it can be had at nearly every hand. Most lines of trade are sharing in the gains. Moreover, and this is the satisfying phase of the prevailing condition, there appears every reason for the firm belief this improvement spurt will not be shortlived but will be lasting.

The Federal Reserve Board reports industrial production during the first seven months of this year was 6 per cent larger than a year ago. Steel mill operations expanded, and lumber output was greater. Automobile production has shown a very large increase, and textile output, because of silk mill activity, has been larger. Although there is usually a considerable decline in the summer season, factory employment and output in July were maintained at the June level, the index of industrial production remaining at 86 per cent of the 1923-1925 average.

Several basic features lend much impressiveness to the current general improvement. One is the big gain in building. Residential, public building and other construction has recorded increases little short of surprising in recent months. Steel mill activity is mounting at a steady pace, and production and sales of automobiles have increased sharply over last year. Retail movement of merchandise has scored material gains. The influx of retail buyers into New York and Chicago in recent weeks has approached very close to record proportions, and it is reliably stated that the orders placed insure a busy autumn period for wearing apparel and other manufacturers of retail articles.

Paper manufacturers and distributors are looking for a good increase in consumption and demand for their product. Already this anticipated broadening of market activity is commencing to manifest itself in some quarters. Paper buyers are more definitely in evidence, and some are making commitments for sizeable supplies. Certain branches of the industry have experienced better market conditions during the last few months than in a long while. Foremost among these are building paper mills, including of course roofing felt. Book and writing paper plants are becoming busier also, as are wrapping and many of the specialty mills.

Rumors are rampant there will be an increase in the price of newsprint for 1936. Everything seems to tend to the opinion that manufacturers will be able to raise their prices at least $2 to $3 per ton for next year's contracts, which will be signed in a couple of months, and successfully maintain the advance. The rumors mostly originate in Canada, where manufacturers seem determined to secure a higher price for newsprint, having arrived at a firm conclusion that at $40 newsprint mills cannot make a profit. Consumption of print paper in the United States will show an increase of 5 per cent for 1935, and as it is largely supplied by Canadian producers, the latter will benefit to the extent of about 100,000 tons this year. Canadian exports to overseas this year have shown a gain of 25 per cent from figures for 1934.

Newspaper advertising for the month of July showed an increase of 1.4 per cent over June, according to Printer's Ink Index, and was 7.1 per cent higher than in July of last year. General advertising increased 9.5 per cent in July over the similar month a year ago, according to *Advertising Age*.

A sharp rise in production of newsprint in Canada in July was sufficient to offset the continued decline of United States output below a year ago, and in addition, was large enough to put the production for both countries for the first seven months of 1935 ahead of the corresponding period last year, according to figures reported by the News Print Service Bureau. Canadian production amounted to 234,266 tons in July, against 208,238 tons last year, an increase of 26,028 tons or 12.5 per cent. United States production was 73,108 tons, compared with 76,184 tons in July, 1934, a decrease of 3,076 tons or 4.2 per cent. Both countries in July produced 307,374 tons, against 284,422 tons a year ago, a rise of 22,952 tons or 8 per cent.

During the first seven months of this year Canadian mills manufactured 1,519,169 tons of newsprint, contrasted with 1,469,871 tons in the same time last year, a rise of 49,298 tons or 3.3 per cent. Production in the United States during the same period was 534,660 tons, against 564,655 tons a year ago, a decline of 29,995 tons or 5.8 per cent. Seven months' output in both countries totaled 2,053,829 tons, compared with 2,034,526 tons last year, an increase of 19,303 tons. Production in both countries exceeded shipments during July, Canadian mills shipping 226,445 tons and U. S. mills 71,070 tons, resulting in a rise in mill stocks from 74,567 tons in both countries at the end of June last to 84,426 tons at the close of July.

Production of paperboard in the United States during June amounted to 256,665 tons, showing a seasonal decline from the 262,463 tons manufactured in the preceding month, but a substantial gain over the 224,214 tons in June of last year. Board mills produced at 66.5 per cent of their rated capacity in June, against 62.7 per cent in May this year, and 57.1 per cent in June a year ago. The June output brought the total for the first half of the current year up to 1,569,645 tons, compared with 1,400,522 tons in the similar time of 1934, and 1,452,577 tons in the first six months of 1933.

New orders for board received by mills during June called for 248,656 tons, against 259,995 tons in the month preceding, while unfilled orders held by manufacturers at the end of June were for a total of 78,020 tons, contrasted with 80,367 tons a month before.

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◆ J. H. Brown with Worthington

Announcement has been received that J. H. Brown, formerly eastern sales manager of Sullivan Machinery Company, has joined Worthington Pump and Machinery Corporation as regional manager of its Mining and Construction Division, covering the midwestern territory, with headquarters in Chicago.

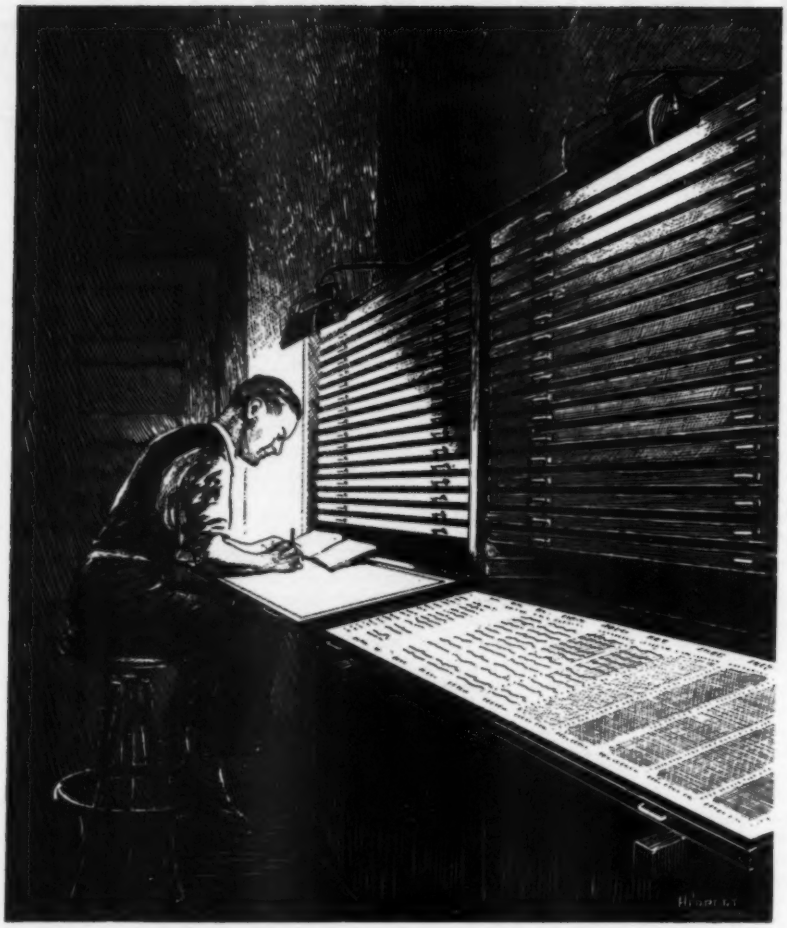
Mr. Brown is a graduate of Massachusetts Institute of Technology. During the N.R.A. period he served as a member of the Code Authority of the Compressed Air Institute. Widely known in construction and mining circles, he brings to Worthington a long experience in the manufacture and sale of equipment for these fields.

◆ Brown Company Asks Reorganization

Announcement was made September 2 by the Brown Company of Portland, Maine, to its bondholders that the company was unable to meet the interest due on its bonds and that a petition would be filed for reorganization under the new national bankruptcy act.

The Brown company has mills at Berlin, N. H. and LaTuque, Que., and also extensive timber holdings in the United States and Canada. Bonds in amount of $21,425,000 were affected.

◆ CLAYTON E. JONES, formerly with the Ohio & Michigan Paper Company, Toledo, and more recently associated with the Petrequin Paper Company, Cleveland, has recently taken over the duties of the City Sales Desk of the Ohio & Michigan Paper Company.



● The Chart Room in the mill of the Pulp Division, Weyerhaeuser Timber Company, at Longview, Washington, where all process variables are graphically recorded.

Uniformity

of physical and chemical characteristics in the pulp made by the Pulp Division of the Weyerhaeuser Timber Company is accomplished by accurate control of the many variables in the manufacturing process. Cumulative graphic records of all vital details assist the pulp makers by furnishing direction to their efforts to constantly improve Weyerhaeuser pulp.

WEYERHAEUSER
STANDARD

PULP DIVISION

WEYERHAEUSER TIMBER COMPANY

LONGVIEW, WASHINGTON

Domestic RAW MATERIALS

◆ Papermaking Rags

If there has been any doubt of the underlying strength in the roofing rag situation the action of the market during the last few weeks has proved it effectually. Prices have continued to move upward, and there would appear to be plenty of signs that top levels have not yet been reached. The basis of the marked improvement in the roofing rag situation over recent months is the sharp increase in building operations all over the country. Figures compiled by the U. S. Department of Labor in Washington show that residential building permits in the United States issued during July gained 183 per cent over the same month last year, while the value of the buildings was up 214 per cent. This, in brief, explains the strong market position of roofing rags, the situation being aided and abetted by a bullish supply condition.

Roofing paper mills have absorbed rag supplies in a constant manner and in sizeable volume. Mills in the East have bought domestic and foreign rags freely, as have mills on the Pacific Coast, while midwestern mills have purchased domestics actively and in some instances have gone far afield in their pursuit of supplies, looking to the East to obtain some lots of rags.

Strength in roofing stock is having its influence in other grades of papermaking rags. Old cottons are tending firmer, and new cotton and linen cuttings are stiffening decidedly in price. There is of course no direct connection between roofing rags and new cuttings, but the active movement of the former apparently is inducing paper manufacturers to buy other rags, and with demand expanding and available supplies none too plentiful, market values are firming.

Roofing felt mills are paying 1.60 cents per pound f. o. b. shipping points for No. 1 domestic roofing stock, and 1.40 cents for No. 2 grade. It is likely these prices have been exceeded in some instances. Foreign dark colored cottons have sold at 1.60 cents ex dock New York or other American Atlantic ports, and foreign linsey garments at 2.00c. Importers report it is becoming increasingly difficult to get roofing rags abroad.

Unfavorable textile industrial conditions, coupled with the customary summer lull, have reduced incoming supplies of new cotton cuttings, declare dealers, who say that stocks of some grades have been diminished to a point where an actual scarcity exists. Most dealers ask 6.25 cents a pound f. o. b. shipping points for No. 1 white shirt cuttings, and quotations range up to 6.50 cents. New blue overall cuttings have advanced to where sales to paper mills at 4.50 cents at shipping points have been recorded, while fancy shirt cuttings are quoted at 2.50 cents f. o. b. points of shipment, new light silesias at 4.50 cents, washables at 2 cents, bleached canton flannels at 5.75 cents, white canvas cuttings at 6.25 cents, and soft unbleached muslins at 6.75 cents.

◆ Old Paper

A fairly good movement of old paper into consuming mill channels is in progress, but demand seems falling just short of a volume sufficient to cause advancement in market prices. In brief, there appears to be an ample supply of practically all grades, and board manufacturers and other consumers are filling their wants without having to grant higher values; at least this is the case in most grades. There are several classes of paper waste which have registered some price gains, but the increases have been narrow.

Old books and magazines have advanced in the Middle West and are now bringing 70 cents per hundred pounds for No. 1 heavy book stock f. o. b. shipping points. On the other hand, book stock is selling in the East at 50 cents per hundred pounds, and is in comparatively slow demand. No. 1 mixed paper is a trifle higher in the East at 25 cents per hundred at shipping points, and folded news is selling at 30 cents. Slightly above these prices obtain in the West. Old corrugated boxes are a firm item, bringing 50 to 55 cents a hundred pounds f. o. b. eastern shipping points, and old No. 1 kraft paper is quotably steady at 90 cents to $1 per hundred. Shavings are relatively quiet yet holding their price position. Dealers generally ask 2 to 2.25 cents per pound for No. 1 hard white shavings, 1.60 to 1.75 cents for No. 1 ordinary soft white and 2 cents or higher for one-cut soft white shavings, while No. 1 hard white envelope cuttings are held by dealers at 2.25 to 2.35 cents.

◆ Rope and Bagging

There appears to be a little more paper mill call for old manila rope, yet the market for this article is far from active. Prices quoted have shown little or no change. Domestic No. 1 old manila rope continues to bring 2 cents a pound f. o. b. dealers' shipping points, though it is stated same purchases are made at slightly less. Importers as a rule ask at least 1.90 cents ex dock New York basis for No. 1 foreign manila rope. Bagging is in fairly good demand, and firm in price, a good part of the firmness being attributed to restricted supplies. No. 1 scrap bagging is selling at 1.40 cents a pound to perhaps a bit higher f. o. b. shipping points, and roofing bagging at 1.15 cents a pound. Old gunny bagging is quoted by dealers at 1.60 cents a pound for No. 1 domestic f. o. b. shipping points, and 1.70 cents for foreign ex dock.

◆ Pulpwood

Open-market demand for pulpwood is reported comparatively slow but it is said a steady movement of supplies keeps up against contracts. Most pulp manufacturers evidently are managing to get along without having to resort to additional buying at present.

◆ Mechanical Pulp

It is no trade secret that domestic and Canadian manufacturers of groundwood are feeling foreign competition in the marketing of their product. A good many consuming mills which formerly bought domestic or Canadian groundwood are now using pulp of Scandinavian origin, and producers on the North American Continent are experiencing difficulty finding a consuming outlet for all the groundwood they are producing or could produce.

The price tone in mechanical pulp is none too firm. The most encouraging development is that, since the formation of the manufacturers' cartel in Europe which will have as its objective a regulation of output, sellers in the Scandinavian countries have insisted on receiving at least a slight rise in price on any commitments entered into for groundwood for shipment to this market in 1936. This of course would infer producers abroad intend to get higher prices next year. Meanwhile, domestic groundwood is approximately $21 to $22 per ton f. o. b. pulp mills, while Canadian is reported available at as low as $14 a ton f. o. b. grinding plants across the border, and $22 to $23 on an ex dock basis at New York and other American Atlantic ports.

◆ Chemical Pulp

Domestic pulp mills seem well fixed with contracts and old orders and are shipping out their product in fair tonnage, but fresh buying for some time has been of narrow compass. Apparently, consumers have their needs covered insofar as the near future is concerned, and are indisposed to purchase farther ahead. Nevertheless a steady to firm tone marks prices, and manufacturers are adhering to quotations prevailing in the market for some time. Bleached sulphite of prime quality is 2.50 cents a pound ex dock Atlantic seaboard, and prime strong unbleached sulphite 1.85 to 2 cents, according to grade. Bleached soda pulp is 2.50 cents delivered paper mills, and domestic or Canadian prime kraft pulp 2 cents delivered consuming points.

◆ Chemicals

Soda ash is quotably steady at 1.20 cents a pound at works for the product packed in bags. Caustic soda is firm at 2.60 to 3 cents for the solid product f. o. b. works, and a good contract movement is reported. Casein is in rather slow demand but quotations show little or no further change at 10.50 to 11 cents for domestic, depending on the grind, and imported 12.75 to 13.50 cents.

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Import and Export MARKETS

IMPORTS

◆ Wood Pulp

While remaining comparatively quiet, the imported wood pulp market displays elements of strength and is characterized by a distinctly firm undertone. Perhaps the strongest factor is that producers abroad are not disposed to sell pulp other than at prices which they name, and which have constituted market levels for some time. Evidences are accumulating that pulp manufacturers in Scandinavia and other parts of Europe are well sold up for the rest of this year, and therefore are not obliged to exert pressure for additional orders over the balance of 1935; moreover, there seems to be a well-defined belief that prices for 1936 will hold firm, and that just as soon as American consumers get more into a purchasing mood they will come into the market to cover next year's requirements.

Meanwhile, pulp importers and agents at New York are doing what they can to drum up business, and are putting out offerings in a customary manner even though they are not pressing to sell. Signs are sizeable sales could be effected were importers enabled to offer at slight recessions from generally recognized market price levels; on the other hand, their principals or suppliers abroad refuse to accept any lower prices, and consequently importers and agents have to insist on the quotations made to paper mill customers. It is the common opinion of the trade that a large amount of buying has to be done, particularly for next year since it is contended 1936 requirements have not begun to be covered as ordinarily by this time, and that in the near future this stored up demand will assert itself and lead to a much livelier market condition.

Prices are about stationary, developing virtually no change from the levels that have long ruled as established market values. Prime bleached sulphite is 2.50 cents per pound to slightly higher, depending on grade, ex dock American Atlantic seaboard, while prime strong unbleached sulphite is 1.85 to 2.05 cents, ex dock basis. It is generally admitted that purchasers are having scant or no success breaking through these price levels; probably in some exceptional cases there have been transactions at a couple of dollars or so per ton less, but it is usually asserted the pulp involved is of half-prime or secondary quality. Kraft, if anything, is even firmer in tone than sulphite, reflecting a very well sold up position of mills in Sweden making this pulp. Prime standard Scandinavian kraft is 1.70 cents ex dock Atlantic seaboard, with this price declared to be the minimum at which buying is being done.

Imports of pulp into the United States continued on a high level during June, when a total of 138,754 short tons of 2,000 pounds, air dry weight, of chemical pulp was imported, valued at $5,218,499, according to U. S. Department of Commerce official figures. This compared with 147,686 short tons of a value of $4,693,031 imported in the preceding month, and 122,274 long tons of a declared value of $4,970,567 in the same month last year. The June arrivals brought the total for the first six months of the current year up to 727,536 short tons of chemical pulp, valued at $28,722,200, compared with 654,512 long tons or 733,053 short tons of a value of $26,544,782 in the corresponding period of 1934.

◆ Paper Stock

Imports of papermaking rags and other waste for papermaking into the United States were larger during the first six months of this year than in the same time a year ago. Imports of pulpwood exceeded those for the corresponding period of 1934 by 41 per cent, but were 48 per cent lower than in the second half of last year. Total imports of all papermaking raw material, including wood pulp of all kinds, reached a value of $33,944,800 in the first half of the current year, a decline of 16 per cent compared with the preceding six months, but a rise of 10 per cent over the corresponding period in 1934.

◆ Paper

Imports of paper and paper products into the United States on the whole have not shown much change over the past 18 months, according to a special report compiled by Phillips A. Hayward, chief of the Forest Products Division of the Bureau of Foreign and Domestic Commerce. Total imports for the period January 1 to June 30, 1935, were valued at $43,283,178, this amount representing a decrease of 3 per cent compared with the preceding six months but an increase of 4 per cent compared with the first six months of 1934. Receipts of standard newsprint, which account for nearly 90 per cent of these imports, totaled 1,100,124 short tons during the first six months of the current year, an increase of 3½ per cent contrasted with the corresponding six months of 1934 but a decrease of 4 per cent compared with the second half of last year. Kraft wrapping paper, boards and cigarette paper account for the greater part of the remaining incoming shipments. Imports of kraft paper during the first half of this year more than doubled those of either the six months periods of last year. Imports of boards, however, have been uniformly lower, while receipts of cigarette paper exceeded those of the previous six months but were 4 per cent less than during the first half of 1934. Imports of paper and paper products, exclusive of newsprint, on the whole were on a level with last year, the total, $5,199,698, exceeding that for the last six months of the year by $144,756, and dropping below that for the first half of the year by $5,008.

EXPORTS

Exports of paper and paper products from the United States during the first half of 1935 showed a substantial increase both in volume and value over the similar period of 1934, according to Mr. Hayward's analysis. Compared with the last six months of 1934, the total value showed a slight decrease, but it is questionable if an actual gain in volume did not take place since the majority of the items on the schedule were substantially larger. Furthermore, in most instances the average export price during the first six months of this year was decidedly under either the July-December or the January-June average during 1934.

Among the items showing consistent increases over the past 18 months are newsprint, cover paper, greaseproof and waterproof papers, surface-coated paper, writing paper, fibre insulating and wallboards and paper hangings. Exports of book paper, wrapping paper, boxboard, boxes and cartons and paper bags showed some improvement over a year ago, but were under the figures recorded for the last six months of 1934. The same holds true for such minor items as towels and napkins, filing folders and other office forms, blotting paper and toilet paper. Shipments of overissue news, which are a leading item on our export schedule, dropped from 47,574 short tons during the first half of 1934 to 46,579 tons during the second half and to 42,344 tons during the first six months of the current year. Total exports of paper and paper products from the United States in the first half of 1935 were valued at $9,896,724, compared with $9,984,188 in the previous six months and $8,889,553 in the first half of 1934.

Exports of paper base stocks during the first six months of this year were also slightly under those of the previous six months but exceeded the total for the corresponding period of 1934 by 75 per cent.

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